STANDARD TREATMENT GUIDELINES

for primary healthcare problems

Dr. Avijit Hazra
Dr. Amitava Sen
Dr. Suparna Chatterjee
Dr. Santanu Kumar Tripathi

Draft reviewed by
Dr. Indranil Mukhopadhyay

September, 2006
A CDMU West Bengal Publication

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Acknowledgment would be appreciated.

Preface

In a developing country like India, with grossly inequitable distribution of socioeconomic resources and the healthcare infrastructure, the only way to extend reasonable preventive and curative services to the masses is to follow the rational use of medicines concept that was first promulgated by the World Health Organization through its essential medicines policy in the 1970s. Essential Medicine Lists, Formularies and Standard Treatment Guidelines, are the three tools for rational drug use. The last is the most challenging instrument to develop but once adopted and implemented with sincerity, can make a vast difference to tackling the majority of day-to-day or primary healthcare problems.

This document is the product of collaboration between Community Development Medicinal Unit (CDMU) West Bengal and Sahay, two non-governmental organizations (NGOs) with different agenda but the common goal of community upliftment. CDMU is engaged in procurement and distribution of essential medicines on behalf of NGOs throughout West Bengal. The development of Standard Treatment Guidelines relevant to the morbidity burden of India in general, and West Bengal in particular, is a long-standing goal of CDMU. The impetus towards realization of this goal was provided by Sahay which took the welcome initiative to promote the essential medicines concept among its project doctors and invited CDMU resource persons as facilitators in its training programs. A list of common primary healthcare problems was drawn up based on the extensive field experience of Sahay's doctors and in a 2-day workshop, in March 2005, treatment guidelines for these problems were discussed and adopted.

In addition to the personal experience of CDMU resource persons and Sahay doctors, this document has drawn upon information from a variety of sources, the more important of which are listed in the reference section. Dr. Indranil Mukhopadhyay, Medical Officer, Badamtam Tea Estate, was gracious in accepting the time consuming task of independently reviewing the guidelines in their draft form. The guidelines are intended for all doctors and healthcare providers working in India. They are not intended to replace medicine or therapeutic textbooks, but they do provide the

essential background information, key diagnostic criteria and the treatment feasible in the most basic of healthcare settings. They also provide clear reference criteria for transferring the patient to higher levels of care. It is up to the users now to implement the standard protocols in consonance with their local environment and available resources. The list of problems, though far from complete, will probably cover over 50% of primary care encounters, at least with children. We hope to expand the list in future.

The National Essential Medicines List recommended by the Government of India (2003 version) and the list of drugs and pharmaceutical formulations banned by the Government of India have been included on the suggestions of some of CDMU's member organizations. We hope that both these sections would be of considerable use.

We will be failing in our duty if we do not acknowledge the constant encouragement that we have been receiving from Prof. K. Weerasuriya, Regional Advisor, Division of Essential Drugs and Medicines Policy of World Health Organization, South East Asia Regional Office (WHO-SEARO), New Delhi, to develop literature in the field of rational use of medicines with participation from the end-users. The publication is being made possible through generous funding support from MISEREOR e. V., Aachen, Germany.

One other point. The document does not provide formulary information about the drugs that it recommends. However, it is important that every healthcare provider is familiar with the drugs that he or she uses. Without this bit of effort and discipline it is easy to make mistakes the cost of which is ultimately borne by the patient.

Finally, as we already said, the list of problems needs to be expanded. We will be grateful for suggestions in this regard and will welcome constructive criticism as to contents and layout.

A.H., A.S., S.C. and S.K.T.

CDMU Documentation Centre, 47/1B Garcha Road, Kolkata – 700 019.

September, 2006

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List of medicines recommended in this document

Aciclovir
Albendazole
Amikacin
Amoxicillin
Amoxicillin + Clavulanate (Co-amoxiclav)
Arteether
Artemether
Artesunate
Aspirin
Azithromycin
Beclomethasone dipropionate
Benzyl benzoate
Benzylpenicillin (Penicillin G)
Betamethasone dipropionate
Bromhexine
Calamine lotion
Cefadroxil
Cefalexin
Cefixime
Cefotaxime
Ceftriaxone
Cefuroxime
Cetirizine
Chloramphenicol
Chloroquine phosphate
Ciprofloxacin
Clobetasol propionate
Clobetasone butyrate
Clotrimazole
Cloxacillin
Codeine
Dexamethasone
Dextromethorphan
Dextrose 5% in Sodium chloride 0.9% infusion
Dextrose 5% infusion
Dicyclomine
Diethylcarbamazine citrate
Domperidone
Doxycycline
Emollient skin preparation
Erythromycin
Ethambutol
Fluconazole
Folic acid
Frusemide
Gamma-benzene-hexachloride
Gentamicin
Glucose powder
Griseofulvin
Hepatitis B vaccine
Hydrochlorothiazide
Hydrocortisone
Hyoscine (Scopolamine)
Ibuprofen
Ipratropium
Iron salt (Ferrous fumarate, Ferrous sulfate)
Isoniazid
Ivermectin
Mebendazole
Metronidzole
Miconazole
Mupirocin
Nalidixic acid
Norfloxacin
Ofloxacin
Oral rehydration solution (ORS)
Oxymetazoline
Paracetamol
Permethrine
Povidone iodine
Prednisolone
Primaquine phosphate
Promethazine
Pyrantel pamoate
Pyrazinamide
Quinine
Rifampicin
Salbutamol
Salmeterol
Sodium chloride 0.9% infusion
Sodium chloride nasal drop
Spironolactone
Streptomycin
Sulfadoxine + Pyrimethamine
Sulfamethoxazole + Trimethoprim (Co-trimoxazole)
Terbutaline
Tetanus toxoid
Theophylline
Tinidazole
Vitamin A
Vitamin B
Vitamin B_{12}-complex

In addition, reference has been made to medical Oxygen.

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Anemias, Nutritional

Definition

Anemia is a state in which hemoglobin [Hb] and the total volume of red blood cells [RBC] decreases. Nutritional anemia results from deficiency of dietary factors like iron, folic acid (folate) and vitamin B_{12}. In our country anemia is common in women of childbearing age and children and is most commonly due to iron deficiency.

Pathogenesis

Iron deficiency is the state in which the body's iron stores are depleted. Iron deficiency develops because the supply of iron does not meet the body's daily requirements.

Dietary causes are most common between 6 months and 2 years of age [Sources of iron in diet – Heme iron in meat, poultry, fish; easily absorbed. Non-heme iron in vegetables like legumes, pumpkin, beans, peas; also in cereals, wheat, barley, oat etc.; not easily absorbed; absorption of iron is enhanced by ascorbic acid and inhibited by tannates in tea and coffee]. Coexistent hookworm infection or schistosomiasis increases risk of iron deficiency.

Chronic blood loss, periods of increased demand and malabsorption must be considered when iron deficiency anemia occurs in patients > 2 years of age. Adolescents may develop iron deficiency due to rapid growth and unusual diets

The deficiency state progresses through 3 stages

- Iron depletion – iron stores depleted, hemoglobin normal.
- Iron deficiency without anemia.
- Iron deficiency with hypochromic, microcytic anemia.

Folate deficiency can occur as a result of malnutrition, dietary peculiarities (e.g. exclusively goat's milk), and increased demand (e.g. rapidly growing children and pregnant women).

Vitamin B_{12} deficiency is rare in children. Causes include dietary deficiency (e.g. strictly vegan diet), malabsorption syndromes affecting terminal ileum, intrinsic factor deficiency, inborn errors of metabolism (e.g. trans-cobalamin II deficiency).

Diagnostic criteria

Clinical: Symptoms and signs vary with the severity of the deficiency.

- Pallor (pale lower eyelid conjunctiva, tongue and nail beds), fatigue, dizzy spells.
- Failure to thrive in children, delayed motor development, behavioral and cognitive effects.

- Pica in some severe cases.
- Soft ejection systolic murmur, congestive heart failure in sever cases.
- Response to trial of iron and folic acid therapy.

***Investigations*:**

- Hemoglobin below normal for age and sex [Usually < 11 g/dL in women and children and < 12 g/dL in men].
- In iron-deficiency, microcytic hypochromic anemia – low mean corpuscular volume [MCV] and mean corpuscular hemoglobin [MCH].
- In folate or vitamin B_{12} deficiency, macrocytic anemia – elevated MCV and MCH (mean corpuscular hemoglobin.
- Blood smear showing pale microcytes in iron-deficiency, macro-ovalocytes and polysegmentation of neutrophils in folate or vitamin B_{12} deficiency (in severe cases pancytopenia).
- In iron-deficiency, decreased serum iron, decreased ferritin, decreased transferrin saturation, elevated total iron binding capacity.
- In folate or vitamin B_{12} deficiency, decreased serum vitamin B_{12} or RBC folate.

Referral criteria

- Severe anemia requiring transfusion of packed red cells or parenteral iron replacement.
- Anemia with heart failure.
- Iron deficiency anemia where the underlying cause cannot be established.
- Patients not responding to adequate therapy.
- All megaloblastic anemias.

Nutritional Anemias		
	Management	**Comments**
Non-drug treatment	Dietary modifications to ensure adequate intake of iron, folate and vitamin B_{12} (meat, fish, chicken, liver; also dark leafy vegetables peas, lentils, etc.). Transfusion of packed red blood cells may be needed if hemoglobin is very low and patient is in cardiac failure. Try to **avoid** blood transfusion until all investigations have been done.	Identify and treat the underlying cause. Nutrition education to caregivers is an important treatment objective – educate on dietary requirements. Advise regarding spacing and family planning to women.
Drug treatment Iron deficiency:	Elemental iron, PO, ADULT 100-200 mg/day in up to 3 divided doses; CHILD 4–6 mg/kg/day in up to 3 divided doses; Continue until hemoglobin is normal and then for a further 3 months to replenish iron stores. Ferrous sulfate (30% elemental iron) is a recommended preparation – 200 mg containing 60 mg elemental iron. Therapeutic dose would be 1 tab twice or thrice daily in ADULT. Tablets containing 200 mg of ferrous sulfate and 500 microgram of folic acid are acceptable, particularly in pregnant women. Ferrous fumarate (32% elemental iron) is an alternative preparation; it may be used in liquid formulations containing 100 to 150 mg of the salt per 5 mL. With the latter strength the therapeutic dose in CHILD will be 5 mL twice or thrice daily. Response to parenteral iron is NOT faster but it is more CERTAIN. Parenteral iron treatment should only be under supervision of a doctor adequately trained in its use.	Iron preparations should be given on empty stomach (1 hour before meals) unless gastrointestinal tolerability problems arise, in which case they should be given after food. Inform about dark stools and possible stomach upset. Heme iron is not preferable as its source is questionable. Ferrous iron is preferable to ferric iron as it is better absorbed. Modified release preparations of iron (e.g. 'Spansule' formulations) are not recommended as they may carry the iron beyond the duodenum to a portion of the gut where iron absorption is poor. New preparations of iron, such as iron(III) hydroxide polymaltose complex should be avoided as their bioavailability is uncertain and they are usually more expensive.

Continued

Nutritional Anemias		
	Management	**Comments**
Folate deficiency:	Folic acid, PO, 5 mg daily until hemoglobin returns to normal value for age and sex.	In megaloblastic anemia, patient may need prolonged treatment for malabsorption states and congenital deficiencies. Genuine vitamin B_{12} deficiency usually requires supervised parenteral treatment.
Vitamin B_{12} deficiency:	Vitamin B_{12}, IM, 200-1000 micrograms monthly until hemoglobin returns to normal value for age and sex.	
Drug prophylaxis	In the latter two trimesters of pregnancy: Recommended fixed dose combinations of iron and folic acid may be used e.g. Elemental iron 60 mg + Folic acid 500 microgram daily PO. Term infants: Elemental iron, 1mg/kg/24 hours. Pre-term infants: Elemental iron, 2–4 mg/kg/24 hours. Ferrous sulfate 200 mg tablet, prophylactic dose would be 1 tab once daily in ADULT. Ferrous fumarate liquid containing 150 mg salt per 5 mL, prophylactic dose in CHILD would be 5 mL once daily.	Avoid parenteral iron for prophylaxis. Avoid iron in sickle-cell anemia.

Asthma, Bronchial (Chronic)

Definition

A disorder characterized by recurrent episodes of airway narrowing (bronchospasm) that are reversible either spontaneously or by use of medication.

Pathogenesis

Reversible narrowing and obstruction of the airways is caused by an inflammatory process triggered by exposure to allergens, viral infections, environmental pollutants like smokes and fumes, weather changes, or other irritants. Exercise and emotional upsets can also precipitate asthma attacks. Mast cells throughout the bronchi release substances such as histamine and leukotrienes, which cause smooth muscle to contract, mucus secretion to increase, and eosinophils to migrate to the area. Eosinophils release additional mediators contributing to airway narrowing. The inflammatory process is associated with epithelial denudation, mucosal edema, increased and viscous secretions, mucus plugs and smooth muscle contraction. The condition usually begins in childhood, although some adults develop asthma, even in old age.

Bronchial asthma is a chronic disorder, punctuated by acute exacerbations. Severe exacerbations can be life-threatening. Pneumothorax is another **complication**. Asthma in children can interfere with normal growth and development.

Diagnostic criteria

***Clinical*:**

- Coughing and wheezing, varying in intensity and frequency. Some patients are symptom-free most of the time except when exposed to irritants. Some have almost daily symptoms. A dry cough at night or while exercising may be the only symptom in some.
- Clear, viscid sputum during attacks. Mucus plugs may be expectorated at times.
- A typical acute asthma attack may begin suddenly with wheezing, coughing, shortness of breath, and chest tightness. Wheezing is particularly noticeable when the person breathes out. The attack may be over in minutes, or it may last for hours or days. At other times, an attack may come on slowly with gradually worsening symptoms. In either case, people with asthma usually first notice shortness of breath, coughing, or chest tightness.
- In a very severe asthma attack, the person is able to say only a few words without stopping to catch his breath. However, wheezing may diminish, because hardly any air is moving in and out of the lungs. Confusion, lethargy, and cyanosis are signs that the oxygen supply is severely limited, and emergency treatment is needed.

- Asthma must be considered in a child with chronic, persistent or recurrent coughing and/or wheezing that responds to a bronchodilator.
- A family history of atopy, exercise-induced or nocturnal coughing and/or wheezing supports the diagnosis.

Investigations:

- Measurement of peak expiratory flow rate (PEFR) is a bedside test easily performed in older children and adults.
- Additional support for the diagnosis in older children and adults is objective evidence of reversible airway obstruction, measured preferably by > 10% improvement of the FEV_1 10 minutes after administration of a bronchodilator during spirometry (FEV_1 = forced expiratory volume in 1 second).
- Determining what triggers a person's asthma is often difficult. Allergy testing is appropriate when there is a suspicion that some avoidable substance is stimulating attacks. Skin testing can help identify allergens that may trigger asthma symptoms. However, an allergic response to a skin test does not necessarily mean that the allergen being tested is causing the asthma, unless there is a clear temporal relation between exposure and symptoms. Radioallergosorbent test (RAST) on blood samples can be performed to determine the degree of sensitivity to particular allergens.

The following table will assist in the assessment of asthma severity

Assessment of severity of asthma

Criteria	Mild	Moderate	Severe
Frequency of attacks of cough and/or wheeze	Not more than once a month	Not more than once a week	More than once a week or continuous
Night time cough and/or wheeze	None	Infrequent (< once a week)	Frequent
Prior admission to hospital for asthma	None	One previous admission	More than one previous admission or admission to intensive care unit
Peak expiratory flow rate (PEFR) as % of predicted value of patient's best	> 80	60 - 80	< 60

N.B. A patient must be assigned to the most severe grade in which any feature occurs. Regular reassessment (at least every 3 months) is essential as asthma can vary with time.

Referral criteria

- Unstable asthma.
- Asthma interfering with normal life, despite treatment.
- Acute severe asthma.

Chronic Bronchial Asthma		
	Management	**Comments**
Non-drug treatment	Avoid exposure to triggers such as cigarette smoke, offending foods, food preservatives (e.g. sulfites, benzoates), food colors (e.g. tartrazine), drugs (e.g. aspirin, other NSAIDs) and certain pets (e.g. cats). Take measures against house dust mite, if identified as a trigger, e.g. plastic mattress covers, removal of carpets, washing of blankets in hot water (> 70°C), etc.	Education of family members, parents, caregivers is an important aspect of asthma management.
Drug treatment	Inhaled short-acting β2-agonist: Salbutamol 100-200 mcg up to 4 times daily (ADULT). Same dose in CHILD but use less frequently and preferably use spacer. For prophylaxis of exercise-induced symptoms, 200 mcg (ADULT) or 100-200 mcg (CHILD). OR Terbutaline 250-500 mcg up to 4 times daily (ADULT). Same dose in CHILD but use less frequently and preferably use spacer. For prophylaxis of exercise-induced symptoms, 500 mcg (ADULT) or 250-500 mcg (CHILD). Inhaled long-acting β2-agonist: Salmeterol 50-100 mcg twice daily (ADULT) or 50 mcg twice daily (CHILD). Not for relief of acute attack. Standard-dose inhaled steroid: Beclometasone dipropionate 200-400 mcg twice daily (ADULT) or 100-200 mcg twice daily (CHILD). Use spacer in child.	A stepwise approach to treatment facilitates symptom control and avoidance of acute attacks: Step 1 : Inhaled short-acting β2-agonist as required Step 2 : Inhaled short-acting β2-agonist as required PLUS, Regular standard-dose inhaled steroid Step 3 : Inhaled short-acting β2-agonist as required PLUS, Regular standard-dose inhaled steroid PLUS, Regular inhaled long-acting β2-agonist If not controlled, increase dose of inhaled steroid to upper limit of standard dose. Additionally, in patients still experiencing symptoms, or nocturnal symptoms, add one of the following :

Continued

Chronic Bronchial Asthma		
	Management	**Comments**
Drug treatment (Continued)	High-dose inhaled steroid: Beclometasone dipropionate 400-1000 mcg twice daily (ADULT) or 200-400 mcg twice daily (CHILD). Use high-volume spacer. Avoid using in CHILD < 5 years without specialist advice. Controlled release oral theophylline (anhydrous): Initial doses: 12 - < 15 kg, 100 mg 12 hourly; maximum 300 mg/day 15 - < 20 kg, 100 mg 12 hourly; maximum 400 mg/day 20 - < 30 kg, 150 mg 12 hourly; maximum 600 mg/day 30 - < 40 kg, 200 mg 12 hourly; maximum 800 mg/day 40 - < 50 kg, 200 mg 12 hourly; maximum 900 mg/day. Controlled release oral β2-agonist: Salbutamol Controlled release 8 mg twice daily (ADULT) or 4 mg twice daily (CHILD > 4 years) OR Terbutaline Controlled release 5-7.5 mg twice daily (ADULT).	– Controlled release oral theophylline – Controlled release oral β2-agonist Step 4 : Inhaled short-acting β2-agonist as required PLUS, Regular high-dose inhaled steroid PLUS, Regular inhaled long-acting β2-agonist PLUS, Sequential trial of one of the following: – Controlled release oral theophylline – Controlled release oral β2-agonist Step 5 : Inhaled short-acting β2-agonist as required PLUS, Regular high-dose inhaled steroid PLUS, One or more of the long-acting bronchodilator options in Step 4. PLUS, Regular oral steroids in a single daily (minimum possible) dose Patients who require Step 4 or 5 management preferably are to be referred. Review treatment every 3 months. If good control has been achieved, stepwise reduction can be attempted. Dose of regular inhaled steroids should be reduced slowly e.g. by 50% every 3 months.
Intercurrent bacterial infections:	Erythromycin, oral, 500 mg (ADULT) or 10 mg/kg (CHILD) 6 hourly for 7-10 days. OR Doxycycline, oral, 100 mg twice daily for 7-10 days. Not indicated in children below 8 years. OR Ofloxacin, oral, 200-400 mg (ADULT) 12 hourly for 7-10 days. Not recommended in children below 12 years.	

Bronchitis, Acute and Acute Exacerbation of Chronic Bronchitis

Definition

Acute inflammation of the mucosal lining of the tracheobronchial tree.

Pathogenesis

Acute bronchitis usually occurs due to spread of infection from the upper respiratory tract, and may be viral or bacterial in origin. Chronic bronchitis, which comprises majority of cases of chronic obstructive pulmonary disease, is characterized by chronic cough with expectoration due to irreversible changes in the respiratory mucosa from the action of irritants like cigarette smoke, fumes, industrial and environmental pollutants. Proliferation of mucus producing cells in the respiratory epithelium, at the cost of ciliated cells, leads to overproduction of mucus with reduced mucociliary clearance. Airflow obstruction may supervene and this worsens prognosis. Secondary bacterial infection, usually due to streptococci or *Haemophilus influenzae*, leads to acute exacerbation of symptoms and a frankly purulent sputum. Unlike acute bronchitis, which may occur at any age, chronic bronchitis is a disease of middle and old age and its chronic course is punctuated by acute exacerbations and remissions.

Acute exacerbation of chronic bronchitis may be **complicated** by respiratory failure.

Diagnostic criteria

***Clinical*:**

- Cough with expectoration – sputum tends to be viscid and tenacious and may be mucopurulent or frankly purulent. There may be occasional rusty tinge to the sputum from presence of blood.
- Chest discomfort while coughing.
- Fever.
- Preceding upper respiratory tract infection (acute bronchitis) or a history of chronic bronchitis (acute exacerbation of chronic bronchitis).
- Symptoms of airflow obstruction in chronic bronchitis, such as breathlessness, wheezing and chest tightness, may worsen with its acute exacerbation.
- On chest auscultation, variable number of inspiratory or expiratory rhonchi, and crepitations (often over the lower lobes).

***Investigations*:**

Diagnosis is usually clinical, but

- Blood cell counts can confirm presence of bacterial infection.

- Lung function tests such as peak expiratory flow rate (PEFR) measurement and assessment of forced expiratory volume in one second (FEV_1) by spirometry will indicate the degree of airflow obstruction.
- Measurement of arterial blood gases is needed if respiratory failure suspected.

Referral criteria

- Inadequate response to standard treatment.
- Onset of respiratory failure in chronic bronchitis patients.

Acute Bronchitis and Acute Exacerbation of Chronic Bronchitis		
	Management	**Comments**
Non-drug treatment	Hydration of the patient is important – ensure adequate fluid intake. Steam inhalation can help liquefy thick tenacious sputum. Oxygen inhalation may be needed for severe acute exacerbation of acute bronchitis, particularly in elderly individuals.	Advise patient of chronic bronchitis to avoid irritants such as smoking, fumes, environmental pollutants.
Drug treatment	Amoxicillin, oral, preferably after food < 20 kg, 10 mg/kg 8 hourly, for 5-10 days > 20 kg, 250–500 mg 8 hourly, for 5-10 days. OR Erythromycin, oral, 500 mg (ADULT) or 10 mg/kg (CHILD) 6 hourly for 5-10 days. OR Amoxicillin + Clavulanate (Co-amoxiclav), oral, 500 mg + 125 mg (ADULT) or 10 mg/kg in terms of amoxicillin base (CHILD) 8 hourly for 5-10 days. By IV injection, in terms of amoxicillin base, 1 g 8 hourly (ADULT) or 25 mg/kg (CHILD) 8 hourly – may be given 6 hourly in serious infections. OR Ofloxacin, oral, 200-400 mg (ADULT) 12 hourly for 5-10 days. Not recommended in children below 12 years age.	Antibiotic therapy is not required routinely in acute bronchitis. It should be instituted in children if there is clear evidence of bacterial infection, element of immunocompro-mise, cardiac disease or history of pneumonia. It is considered in adults if age is above 60 years, symptoms are suggestive of bacterial infection, symptoms are persistent, underlying chest disease is severe, diabetes is present or there is immunocompromised state. Acute exacerbations of chronic bronchitis usually warrant antibiotic treatment. Initiate antibiotic therapy empirically and reassess if there is no improvement within 48–72 hours.

Continued

Standard treatment guidelines (continued)

Acute Bronchitis and Acute Exacerbation of Chronic Bronchitis		
	Management	**Comments**
Bronchodilator:	Salbutamol, metered dose inhalation with spacer if needed, 200 microgram, 4–6 hourly as needed OR Salbutamol, nebulized, 2.5 mg undiluted given over 3 minutes, repeat 4–6 hourly AND / OR Ipratropium, metered dose inhalation with spacer if needed, 40-120 microgram 6–8 hourly as needed.	Use of bronchodilator is often needed if acute symptoms occur against a background of chronic bronchitis. Use of spacers reduces the need for hand-breadth co-ordination in the use of metered dose inhalers.
Antipyretic/ analgesic/ anti-inflammatory:	Paracetamol, oral, 10 mg/kg 6 hourly. OR Ibuprofen, oral, 400 mg 6 to 8 hourly (ADULT) or 10 mg/ kg 6 to 8 hourly (CHILD), preferably after food.	

Cellulitis

Definition

Cellulitis is a spreading bacterial infection of the skin and subcutaneous tissues.

Pathogenesis

Cellulitis may be caused by many different bacteria; most commonly streptococci. Streptococci spread rapidly in the skin because they produce enzymes that hinder the ability of the tissue to confine the infection. Staphylococci can also cause cellulitis, as can many other bacteria, especially after bites by humans or animals or after injuries in water or dirt.

Bacteria usually enter through small breaks in the epidermis that result from scrapes, punctures, burns, and skin disorders such as dermatitis. Areas of the skin that become swollen with fluid (edema) are especially vulnerable. Cellulitis may also be preceded by another skin infection, e.g. impetigo, ecthyma, folliculitis. However, cellulitis can also occur in skin that is not overtly injured or infected.

There may be rapid, local spread of the infection involving the skin, subcutaneous tissue and lymphatic pathways. As the infection spreads, nearby lymph nodes may become enlarged and tender (lymphadenitis). Other **complications** include acute lymphangitis, skin abscesses and septicemia. Sepsis can occur with minimum local suppuration. If cellulitis affects the same site repeatedly, especially the leg, lymphatic vessels may be damaged, causing permanent swelling of the affected area.

Diagnostic criteria

***Clinical*:**

- Cellulitis most commonly develops on the legs but can occur anywhere.
- First symptoms are redness and tenderness over an area of skin, followed by warmth and swelling. These symptoms of inflammation are caused by the bacteria themselves as well as by the body's attempts to halt the infection.
- Fluid-filled blisters, which may be small (vesicles) or large (bullae), sometimes appear on the infected skin.
- In cellulitis, the edges of the inflammation are not sharply demarcated. **Erysipelas** is one form of streptococcal cellulitis in which the skin is bright red and noticeably swollen and the edges of the infected area are raised.
- Swelling of regional lymph nodes indicates deeper spread of infection.
- Most people with cellulitis feel only mildly ill, but some may have fever, chills, tachycardia and headache.

***Investigations*:**

Cellulitis is usually a clinical diagnosis and laboratory identification of the bacteria from blood, pus, or tissue specimens is seldom necessary unless a person is seriously ill. Sometimes, investigations are required to differentiate cellulitis from venous thrombosis.

Referral criteria

- Suspected septicemia.
- Cellulitis not responding to adequate treatment.

Cellulitis		
	Management	**Comments**
Non-drug treatment	Ensure adequate nutrition and hydration.	The affected part of the body, when possible, is kept immobile and elevated to help reduce swelling. If wound present, check to see that it is clean and devoid of foreign bodies.
Drug treatment	Amoxicillin, oral, preferably after food < 20 kg, 10 mg/kg 8 hourly, for 5-10 days > 20 kg, 250–500 mg 8 hourly, for 5-10 days. OR Erythromycin, oral, 500 mg (ADULT) or 10 mg/kg (CHILD) 6 hourly for 5-10 days. OR Amoxicillin + Clavulanate (Co-amoxiclav), oral, 500 mg + 125 mg (ADULT) or 10 mg/kg in terms of amoxicillin base (CHILD) 8 hourly for 5-10 days. By IV injection, in terms of amoxicillin base, 1 g 8 hourly (ADULT) or 25 mg/kg (CHILD) 8 hourly – may be given 6 hourly in serious infections. OR Cefalexin, oral, 500 mg (ADULT) or 250 mg (CHILD 6 to 12 y) or 125 mg (CHILD 1 to 5 y) 8 hourly for 5-10 days. For infants 125 mg 12 hourly is the dose. All doses may be doubled in severe infection.	Choice of intravenous or oral antibiotics depends on the severity of the condition. Erythromycin is a good choice in penicillin allergic patients. Cefadroxil is an alternative to Cefalexin. Dose is, oral, 500 mg (ADULT) or 250 mg (CHILD 6 to 12 y) or 125 mg (CHILD 1 to 5 y) 12 hourly. All doses may be doubled in sever infection. For facial cellulitis, consider adding Metronidazole, oral, 10 mg/kg 8 hourly.

Continued

Standard treatment guidelines (continued)

Cellulitis		
	Management	**Comments**
Antipyretic/ analgesic/ anti-inflammatory:	Paracetamol, oral, 10 mg/kg 6 hourly. OR Ibuprofen, oral, 400 mg 6 to 8 hourly (ADULT) or 10 mg/ kg 6 to 8 hourly (CHILD), preferably after food.	

Common Cold and Cough (Coryza)

Definition

Acute, contagious, self-limiting viral infection of the upper respiratory tract.

Cough is a defense response of the lower respiratory passage. It is produced by inflammatory, mechanical or chemical stimulation of cough receptors.

Pathogenesis

Cold and cough are common occurrences, particularly in the winter season. Children are liable to suffer recurrent attacks every year. In common cold, the primary infection is caused by various viruses, usually belonging to rhinovirus or coronavirus families, spreading through infective droplets. Incubation period is short. Abrupt temperature changes appear to predispose to infection. The viruses probably have a direct cytopathic effect on the respiratory epithelium.

Cough may be of productive or non-productive [dry cough] types. It is a common symptom of a large variety of disorders of the respiratory tract such as coryza, pharyngitis, tonsillitis, pneumonia, bronchitis, asthma, tuberculosis, measles, foreign bodies etc., which need to be kept in mind.

Otitis media in children and sinusitis in adults are common **complications**. Acute bronchitis and pneumonia are also possible.

Diagnostic criteria

***Clinical*:**

- Running nose (initially a copious mucoid exudate), throat irritation (sore throat) and cough.
- Headache, malaise, and fever may occur.
- Conjunctival congestion.
- Intensification or persistence of fever may indicate secondary bacterial infection or spreading infection to lower respiratory tract.

***Investigations*:**

- Usually not needed; however, may help to exclude other diagnoses.
- Blood in the sputum [hemoptysis] or cough persisting for more than 3 weeks needs special investigations.

Referral criteria

- Symptoms persisting or recurring frequently despite usual treatment.
- Hemoptysis.

Common Cold and Cough (Coryza)		
	Management	**Comments**
Non-drug treatment	Steam inhalation for 5 minutes a few times each day may help ease the cough. Warm drinks (e.g. tea, coffee, soups) are soothing.	
Drug treatment Antiviral treatment:	Specific antiviral treatment is not available and neither is it needed.	Antibiotics are not required in coryza unless there is suspicion of a genuine secondary bacterial infection. Fever alone cannot be an indication to start antibiotics. If symptoms of otitis media or sinusitis develop, treat accordingly.
Fever, headache:	Paracetamol, oral, 10 mg/kg 6 hourly. OR Ibuprofen, oral, 400 mg 6 to 8 hourly (ADULT) or 10 mg/kg 6 to 8 hourly (CHILD), preferably after food.	
Reduction of secretions:	Promethazine, oral, ADULT 10-20 mg 2-3 times daily; CHILD under 2 years not recommended; CHILD 2-5 years 5-15 mg daily in divided doses; CHILD above 5 years 10-25 mg daily in divided doses. OR Cetirizine, oral,	Use of nasal decongestants, either systemically or locally (as nasal drops) is not recommended. Unwarranted rise in blood pressure can occur in adults with uncontrolled hypertension, cardiac and cerebrovascular disorders, or hyperthyroidism. Phenylpropanolamine has been withdrawn in some countries. Decongestant nasal drops give temporary relief but can predispose to recurrent use and rebound nasal congestion on withdrawal.

Common Cold and Cough (Coryza)		
	Management	**Comments**
	ADULT 10 mg once daily; CHILD under 2 years not recommended; CHILD 2-5 years 5 mg once daily or 2.5 mg twice daily; CHILD above 5 years 10 mg once daily or 5 mg twice daily.	
Productive cough:	Bromhexine, oral, preferably after food ADULT 8 mg three to four times daily, CHILD 1-5 years 4 mg twice daily; CHILD above 5 years 4 mg three to four times daily.	Productive cough should not be suppressed.
Exhausting unproductive cough:	Syrup / Linctus preparation containing Dextromethorphan hydrobromide administered orally in a dose of 5 - 7.5 mg dextromethorphan three times daily for CHILD aged 1 to 5 years, and 7.5 - 15 mg three times daily for CHILD aged 6 to 12 years.	Syrup / Linctus preparation containing Codeine phosphate administered orally in a dose of 3 mg codeine three to four times daily for CHILD aged 1 to 5 years, is an alternative to dextromethorphan. However, codeine is liable to cause constipation and drowsiness in young children and so should be avoided if possible.

Dysentery, Amebic (Amebiasis)

Definition

Diarrhoea with blood, mucus and pus in the stools, caused by infection of the large intestine with *Entamoeba histolytica*.

Pathogenesis

Transmission is by the feco-oral route and by contamination of food and water with ameba cysts. Trophozoites emerge from the cysts and colonize the large bowel where they multiply and produce cysts again. Trophozoites invade the colonic mucosa and capillaries to form ulcers and abscesses. From the colon they may spread to other tissues and organs, e.g. liver, lung or brain.

Complications include abscesses in other organs (liver, lung, brain), bowel perforation with peritonitis, hemorrhage, colonic strictures, ameboma, dehydration.

Diagnostic criteria

***Clinical*:**

- Acute or recurrent diarrheal episodes with mucus, blood and pus in the stools.
- Abdominal pain and colonic tenderness.
- Mild or no fever.

***Investigations*:**

- Amoebic trophozoites with ingested red blood cells in freshly-passed stool specimens or rectal smear.
- Positive serology and fluorescent antibody test.

Referral criteria

- Amoebic dysentery with complications.
- Amoebic dysentery not responding to adequate treatment.
- Recurrent dysentery.

Dysentery, Amebic (Amebiasis)		
	Management	**Comments**
Non-drug treatment	Improvement of personal hygiene. Nutritional support. Monitor and maintain hydration, electrolytes and hematocrit.	Isolate the patient to prevent spread. Other preventive measures include hygienic water supply, washing of vegetables / fruits with uncontaminated water, safe fecal disposal, hand washing, education of parents / children / caregivers.
Rehydration:	Following the rehydration procedure in any acute diarrheal disease with Oral Rehydration Salts (ORS) as the mainstay of treatment.	
Drug treatment	Metronidazole, PO, < 15 kg, 15 mg/kg 8 hourly for 5–7 days; > 15 kg, 10 mg/kg 8 hourly for 5–7 days. OR Tinidazole, PO, ADULT 2 g as single dose daily for 3 days; CHILD 30–50 mg/kg as single dose daily for 3 days.	Metronidazole safety has not been established in children < 2 years. Tinidazole experience in children is also limited. Avoid these drugs in first trimester of pregnancy. These drugs may be given after food. Alcohol or alcohol containing preparations are not to be consumed while taking metronidazole or tinidazole. For invasive intestinal amebiasis Metronidazole may be administered as 800 mg PO thrice daily for 5 days. Metronidazole has excellent oral bioavailability – almost 100%. Hence, there is no reason to administer the drug by a parenteral route unless the patient is unable to take oral medication.

Dysentery, Bacillary (Shigellosis)

Definition

Infection of the large intestine by enteric bacterial pathogens, with passage of blood and mucus in the stools. *Shigella* spp. are the organisms usually implicated.

Pathogenesis

Four strains or subgroups of *Shigella* organisms are responsible for the dysentery, namely *S. dysenteriae*, *S. flexneri*, *S. boydii* and *S. sonnei*. Incubation period is about 1–4 days. Transmission is by the feco-oral route. *Shigella* organisms invade the colonic mucosa, causing mucosal ulceration and micro-abscesses. Enterotoxin production may occur.

Complications include dehydration, shock, acidosis, renal failure, convulsions, toxic megacolon, rectal prolapse and hemolytic-uremic syndrome.

Diagnostic criteria

***Clinical*:**

- Sudden onset.
- Abdominal cramps, peritonism, urgency, fever, and watery diarrhoea with blood and mucus in the stools.
- Meningism and convulsions may occur.

***Investigations*:**

- Many polymorphs and blood in diarrheal stools examined microscopically.
- Diagnosis confirmed by stool culture.

Referral criteria

- Dysentery episode not responding to adequate therapy.
- Dysentery with complications.

Dysentery, Bacillary (Shigellosis)		
	Management	**Comments**
Non-drug treatment	Adequate oral or IV fluid therapy to prevent dehydration.	Outbreak control may be an important treatment objective.
	Monitor hydration status, blood pressure, acid–base status, heart rate, respiratory rate, body temperature and electrolytes.	
Rehydration:	Following the rehydration procedure in any acute diarrheal disease with Oral Rehydration Salts (ORS) as the mainstay of treatment.	Severe dehydration will require hospitalized treatment.
Drug treatment	Trimethoprim/sulfamethoxazole combination preparation, oral, 6 weeks–5 months, 20 / 100 mg twice daily for 5 days; 6 months–5 years, 40 / 200 mg twice daily for 5 days; 6 years–12 years, 80 / 400 mg twice daily for 5 days. OR Nalidixic acid, oral, 55 mg/kg/24 hours in 4 divided doses for 5 days. OR Amikacin, IM or slow IV, 7.5 mg/kg twice or thrice daily, depending on severity (twice daily in CHILD), for 5 days. OR Ceftriaxone, IV, 20–80 mg/kg/24 hours as a single daily dose for 5 days.	Choice of antimicrobial therapy should be based on the susceptibility pattern of recent isolates. Parenteral agents should be reserved for resistant cases and for patients unable to take oral antimicrobial agents. Nalidixic acid is contraindicated in infants < 3 months, and in epilepsy. Amikacin maximum daily dose is 1.5 mg and treatment must not exceed 10 days at a stretch.

Eczema (dermatitis) – Atopic eczema, Seborrheic dermatitis, Contact dermatitis, etc.

Definition

Cutaneous inflammation characterized by papular or vesicular eruption accompanied by pruritus and desquamation. Represents a reaction pattern to a variety of endogenous or exogenous stimuli.

May occur as a primary cutaneous disorder or secondary to other conditions like scabies or venous stasis.

Pathogenesis

In the acute stage, eczema is characterized by epidermal vesicles and inflammatory infiltration of epidermis and dermis. The chronic stage is characterized by hyperkeratosis.

Atopic eczema usually starts within the first year of life and two-thirds of those affected have a family history of atopy (a state characterized by occurrence of one or more of the following – eczema, asthma, allergic rhinitis and allergic conjunctivitis, accompanied by high levels of circulating IgE antibodies commonly to inhaled allergens). Excessive IgE production is not the primary abnormality. A more fundamental imbalance of immune system function is involved. **Complications** include secondary bacterial and viral infections. There is a propensity to develop widespread lesions with herpes simplex infections (eczema herpeticum). Severe atopic eczema has been associated with growth retardation.

Seborrheic dermatitis occurs in the sebaceous gland bearing areas of the scalp, face and chest. Sebum production is not excessive. Endogenous and genetic factors, and an overgrowth of the commensal yeast *Pityrosporum ovale* appear to be involved. The condition may be severe if coexisting with HIV infection.

Contact dermatitis represents cutaneous reaction to an exogenous agent, often a chemical substance. Irritant chemicals cause more cases (irritant contact dermatitis) than allergens (allergic contact dermatitis). Irritant contact dermatitis is often the result of chronic or repeated exposure to the irritant substance, such as soaps, corrosives, abrasives, oils, solvents, detergents, etc. Allergic contact dermatitis represents type IV hypersensitivity. Common allergens responsible are nickel, chromates, cobalt, paraphenylenediamine dyes, cosmetics, colophony, resins, rubber chemicals, preservatives in food, plants and topical medicaments.

Diagnostic criteria

***Clinical*:**

- Redness, vesicles, pustules in the affected areas along with itching and scaling of the skin.
- Large blisters with exudation in acute dermatitis, and fissuring in chronic dermatitis, can be quite painful.

- Intense itching and a remittent course is observed in atopic eczema. Babies show involvement of the face and hands, often with secondary infections. By 18 months, the involvement usually changes to the familiar pattern of antecubital and popliteal fossae lesions. Scratching causes most of the manifestations and may disturb sleep at night. In adults the commonest manifestation is hand dermatitis, with a more generalized and lichenified atopic eczema in a few individuals.
- Seborrheic dermatitis starts with excessive dandruff and then progresses to red, itchy, scaly eruption affecting the scalp margin, eyebrows, ears and nasolabial folds. A follicular type of eruption may affect the back. Flexural involvement of the axillae, groins and submammary folds starts as a moist intertrigo and may be secondarily colonized by *Candida albicans*.
- Infantile seborrheic eczema starts in the first few years of life and presents as moist, shiny, scaly erythema in body fold areas. Unlike napkin dermatitis (nappy rash) the flexures are not spared and unlike atopic dermatitis the lesions are not that pruritic. Occasionally the scalp may be affected.
- Contact dermatitis may affect any part of the body and the site of the lesion may point to the source. Knowing the patients occupations, hobbies, use of toiletries, cosmetics, and medicaments helps. It is not possible to distinguish between irritant and allergic etiology by morphology alone. Acute contact dermatitis of the face needs to be distinguished from angioedema and erysipelas. Chronic contact dermatitis needs differentiation from endogenous forms of dermatitis, psoriasis and fungal infections.
- Occasionally, contact dermatitis manifestations may extend to areas beyond the original site of contact.
- Atopic individuals are predisposed to contact dermatitis.

***Investigations*:**

- Allergy tests (e.g. prick tests, patch tests) may be positive in atopic eczema and contact dermatitis.
- Radioallergoabsorbance test (RAST) for specific allergens is not affected by prior use of steroids and antihistamines but is seldom needed for diagnosis. Serum IgE levels are frequently raised.

Referral criteria

- Severe atopic eczema not responding to usual therapy.
- Eczema herpeticum.
- Dietary exclusion therapy, when need for supervision by a dietician is anticipated.
- Hydrocele.

Eczema (dermatitis) – Atopic eczema, Seborrheic dermatitis, Contact dermatitis, etc.		
	Management	**Comments**
Non-drug treatment	Avoid exposure to trigger or precipitating factors where applicable. Good personal hygiene to avoid introducing an infection. Wet dressings (with weakly pink potassium permanganate soaks) may be soothing for acute exudative eczema. Minimizing use of soap may help in hand dermatitis and atopic eczema. Napkin dermatitis in infants requires the genital areas to be kept clean and dry. Absorbent diapers help prevent recurrence. A barrier cream suitable for pediatric use will have protective effect. Barrier creams seldom help in contact dermatitis but they encourage personal skin care.	Advice to cut children's fingernails short to stop them from further injuring the skin by scratching; with babies it may be necessary to cover their hands in the acute phase with gloves or socks. Dietary manipulation may help some children with atopic eczema. Work practices can be improved in contact dermatitis, even if change in job is not practical. Protective clothing (e.g. PVC gloves) should be worn, unnecessary contact avoided and adequate washing and drying practices followed.
Drug treatment Mild cases: Moderate cases:	Emollients e.g. aqueous cream applied daily (several times). Hydrocortisone 1% ointment twice daily. OR Clobetasone butyrate 0.05% cream twice daily.	For facial skin, highly potent topical steroids (e.g. Clobetasol propionate) should not be used and other steroids should not be applied for more than 7-10 days at a stretch. For maintenance therapy, avoid higher potency steroids where a lower potency will suffice.

Continued

Eczema (dermatitis) – Atopic eczema, Seborrheic dermatitis, Contact dermatitis, etc.		
	Management	**Comments**
Severe cases:	Betamethasone dipropionate 0.05% cream or ointment twice daily. OR Clobetasol propionate 0.05% cream or ointment twice daily.	
Infected eczema (secondary bacterial infections):	Treat as for impetigo.	Povidone iodine 5% ointment may suffice for limited lesions.
Pruritus:	Promethazine, oral, ADULT 25 mg at bedtime, increased to 25 mg twice daily if needed. CHILD under 2 years not recommended; CHILD 2-5 years 5-15 mg daily in divided doses; CHILD above 5 years 10-25 mg daily in divided doses. OR Cetirizine, oral, ADULT 10 mg once daily; CHILD under 2 years not recommended; CHILD 2-5 years 5 mg once daily or 2.5 mg twice daily; CHILD above 5 years 10 mg once daily or 5 mg twice daily.	

Filariasis, lymphatic

Definition

Infection with any of several threadlike roundworms (nematodes). The most common type of filariasis is infection with filarial worms that live in the human lymph system. This is called lymphatic filariasis.

Lymphatic filariasis is a disease of the tropics. *Wuchereria bancrofti*, the most common filariasis parasite, is found in Africa, India, Southeast Asia, the Pacific islands, the Caribbean, and South America. The *Brugia malayi* and *Brugia timori* parasites are found in Southeast Asia.

Pathogenesis

Filariasis is spread from infected persons to uninfected persons by various species of mosquitoes. Adult worms live in an infected person's lymph vessels. The females release large numbers of microscopic larvae (microfilaria), which circulate in an infected person's bloodstream. When the person is bitten by a mosquito, the mosquito can ingest the microfilaria. These develop in the mosquito and can then be spread to other people via mosquito bites. After a bite, the larvae pass through the skin, travel to the lymph vessels, and develop into adults, which live about 7 years. Then the cycle begins again.

Symptoms appear 5-18 months after repeated infected mosquito bites. Long-term exposure and repeated infections can cause severe damage to the lymph system and debilitating **complications** like hydrocele and elephantiasis. Skin and lymphatic vessels can become secondarily infected with bacteria.

Diagnostic criteria

***Clinical*:**

Most of the signs and symptoms of filariasis are a consequence of the adult worms living in the lymph system. The disease is rarely fatal, but it can cause recurring infections, fevers, severe inflammation of the lymph system, and a lung condition called tropical pulmonary eosinophilia. Lymphangitis results in pain and redness of the skin if these vessels are near the surface, mainly in the lower leg or thigh, and tender enlargement of the lymph nodes. Release of microfilariae may be accompanied by allergic symptoms such as wheeze.

Over time, tissue damage caused by the worms restricts the normal flow of lymph fluid. This results in swelling, scarring, and secondary infections. The legs and groin are most often affected. In about 5% of infected persons, elephantiasis of the legs develop leading to severe disfigurement, decreased mobility, and long-term disability. Disfiguring enlargement of the scrotum results from testicular hydrocele.

***Investigations*:**

- Detection of microfilariae in timed blood smears. Different species release microfilariae at different times of the day or night to correspond with the optimal biting time of the insect transmitting infection. Thus *Brugia malayi* microfilariae are usually found at night, and the blood sample needs to be taken between midnight and 2 AM. *Wuchereria bancrofti* can produce microfilariae either during the day or at night depending on the type.
- Evidence of current or previous presence of adult worms in lymphatic vessels can be demonstrated lymphangiography.

Referral criteria

- Gross lymphatic obstruction.
- Hydrocele.

Lymphatic Filariasis		
	Management	**Comments**
Non-drug treatment	Rigorous hygiene of the affected limbs with adjunctive measures to minimize infection and promote lymph flow are important for reducing acute episodes of inflammation.	Prevention centers on mass treatment with anti-filariasis drugs to prevent ingestion of larvae by mosquitoes, public health action to control mosquitoes, and individual action to avoid mosquito bites. To avoid being bitten by mosquitoes, patients should be advised to stay indoors between dusk and dark. This is when culicine mosquitoes are most active in their search for food. When outside, wear long pants and long-sleeved shirts. Treat exposed skin with an insect repellent.
Drug treatment	Diethylcarbamazine citrate (DEC), Oral. Total cumulative dose is 72 mg/kg for *W. bancrofti* infections with half this dose used for *B. malayi* and *B. timori* infections. In all cases treatment should be initiated with smaller doses for 2 –3 days to avoid the danger of immunological reactions. Thus initial dosing may be 0.5 mg/kg thrice daily for 3 days, followed by 1.5 mg/kg thrice daily for 15 days for bancroftian filariasis. OR Ivermectin, Oral, 400 microgram/kg as single dose. Albendazole, Oral, 10 mg/kg (600 mg in ADULT) as single dose, with either diethylcarbamazine or ivermectin may also be used.	In communities where filariasis is endemic, annual administration of single doses of ivermectin, 400 microgram/kg. may be effective in reducing transmission. This treatment must be continued for at least 4–6 years. Like DEC, it kills microfilariae and most adult worms, although some may survive and cause the infection to relapse. Adverse reactions are common with both of these treatments, particularly DEC. Side effects generally arise because of an allergic response to killing large numbers of worms, and can be reduced or controlled by steroids, antihistamines and NSAIDs.

Giardiasis

Definition

Infection of the small intestine with *Giardia lamblia* producing mild to moderate acute diarrheal illness or à chronic diarrhea-malabsorption disorder.

Pathogenesis

Infection is acquired by ingestion of water or food contaminated by cysts of *G. lamblia* or by feco-oral contamination. Following cyst ingestion, liberated trophozoites live non-invasively in the small bowel. *G. lamblia* organisms attach to the brush border and may cause local damage with decrease of brush-border enzymes.

The parasite usually produces an acute, self-limited, diarrheal illness that subsides spontaneously within 7–10 days. Sometimes the diarrhoea becomes chronic with resultant failure to thrive and lactase deficiency with malabsorption of lactose.

Complications other than chronic malabsorption syndrome is uncommon.

Diagnostic criteria

***Clinical*:**

- Acute, intermittent or chronic diarrhoea unresponsive to conservative management.
- Stools are usually foul smelling and greasy.
- Fever and vomiting occur in a minority of patients.
- Malaise, flatulence, bloating, nausea, abdominal pain, weight loss.

***Investigations*:**

- Cysts on microscopy of fresh fecal specimens.
- Trophozoites can be identified in duodenal aspirates or in liquid stools.
- *Giardia* antigens in stool specimens.

Referral criteria

- Giardiasis with malabsorption and failure to thrive.
- Giardiasis not responding to adequate treatment.

Giardiasis		
	Management	**Comments**
Non-drug treatment	Improvement of personal hygiene. Nutritional support. Monitor and maintain hydration.	Preventive measures include hygienic water supply, washing of vegetables / fruits with uncontaminated water, safe disposal of feces, hand washing, education of parents / children / caregivers. Hygiene education to parents, children and caregivers should be an important treatment objective.
Rehydration:	Following the rehydration procedure in any acute diarrheal disease with Oral Rehydration Salts (ORS) as the mainstay of treatment.	
Drug treatment	Metronidazole, Oral, < 15 kg, 15 mg/kg 8 hourly for 5 days; > 15 kg, 10 mg/kg 8 hourly for 5 days. OR Tinidazole, Oral, ADULT 2 g as single dose; CHILD 30–50 mg/kg as single dose.	Metronidazole safety has not been established in children < 2 years. Tinidazole experience in children is also limited. Avoid these drugs in first trimester of pregnancy. These drugs may be given after food. Alcohol or alcohol containing preparations are not to be consumed while taking metronidazole or tinidazole. Alcohol or alcohol containing preparations are not to be consumed while taking metronidazole or tinidazole.

Hepatitis, Viral

Definition

Acute inflammation of the liver with varying degrees of hepatocellular necrosis caused by hepatitis A, E, B and less commonly C and D.

Pathogenesis

Hepatitis A virus is spread by the feco-oral route. The infection may be asymptomatic, symptomatic with complete recovery and no carrier state, or rarely (0.5% cases) may cause fulminant hepatitis. Mainly children affected. Common in situations of poor housing and living conditions, lack of proper waste disposal and poor standards of sanitation and personal hygiene. Asymptomatic in 50–90%.

Hepatitis B is transmitted parenterally (through blood, blood products, blood contaminated objects), perinatally from mother to newborn child, or by sexual contact. The infection may be asymptomatic, cause symptomatic disease (10-20% of cases), fulminant hepatitis (1% of cases) or a chronic carrier state which puts the patient at risk for development of cirrhosis and hepatocellular carcinoma in later life.

Hepatitis C infection is often liable to be chronic (50%) and is another cause of cirrhosis and hepatocellular carcinoma. Like hepatitis B it is transmitted by parenteral routes.

Hepatitis D virus (delta virus) infection occurs only in children co-infected with HB virus.

Hepatitis E disease is enterically transmitted, resembles infection with hepatitis A, but most commonly affects young adults. It can be dangerous in pregnancy (mortality 10–40%).

Complications of viral hepatitis include acute liver failure, chronic hepatitis, cirrhosis, portal hypertension, chronic liver failure, and hepatocellular carcinoma. Complications are uncommon with hepatitis A and E.

Diagnostic criteria

***Clinical*:**

- Prodromal phase: Nausea, vomiting, malaise, anorexia, fever, right upper quadrant abdominal pain.
- Subsequent phase: Jaundice, tender hepatomegaly, dark urine.

***Investigations*:**

- Raised liver enzymes (particularly transaminases) and bilirubin.
- Serological evidence of hepatitis [See Table]

Referral criteria

- Acute hepatitis with liver failure (isolation recommended).
- Chronic hepatitis B infection (for liver biopsy to evaluate severity of inflammation or presence of cirrhosis).
- Chronic hepatitis with or without cirrhosis.
- Fulminant hepatitis A (severe vomiting, jaundice, bleeding tendency, altered consciousness).

Serological markers of viral hepatitis

Hepatitis A	Hepatitis B	Hepatitis C
Raised serum transaminases and anti-HAV IgM (persists for 6 months).	Raised serum transaminases with HBsAg in serum. Anti-HBc IgM appears after 3 weeks. HBsAg should disappear from serum within 6 months (persistence implies a carrier state). Persistence of HBeAg for > 3 months also identifies the chronic carrier state. HBc IgM implies an acute infection and is supplanted by HBc IgG, which persists after 6 months.	Acute infection is often milder than Hepatitis A with moderately raised transaminases. Anti-HCV is positive.

Viral Hepatitis		
	Management	**Comments**
Non-drug treatment	Low fat, high carbohydrate diet or any diet that the patient tolerates. Rest is needed but bed rest does not alter the course of the disease.	Glucose drinks can be given as a well tolerated source of carbohydrates.
Drug treatment	Anti-emetics until nausea subsides: Domperidone, PO, ADULT 10–20 mg before food up to 4 times daily; CHILD 200–400 mcg/kg up to 4 times daily.	Vitamin B-complex and multivitamins are not mandatory but may be given if the patient's food intake is poor.
Chronic hepatitis B and C infections:	Interferon alfa and Lamivudine are currently used. However, these should not be considered as essential drugs and should not be used in primary care as they require specialist expertise.	Refer to gastroenterologist.
Prevention	Active immunisation: Hepatitis B (routinely in children below 5 years). Good hygiene and sanitation during acute infection.	Measures to prevent the spread of the infection.
Neonatal transmission:	Babies born to mothers with acute hepatitis B infection at the time of delivery or to mothers who are HBsAg-positive or HBeAg-positive should receive: Hepatitis B immunoglobulin, IM, 0.5 mL within 12 hours of delivery, if available PLUS Hepatitis B vaccine, IM, first dose within 12 hours of delivery. Continue hepatitis B immunization according to the recommended immunization schedule.	

Intestinal nematodes (Worm infestations)

Definition

Intestinal infestation with *Ascaris lumbricoides* (roundworm; causing ascariasis), *Enterobius vermicularis* (threadworm; causing enterobiasis), *Ancylostoma duodenale* (old world hookworm; causing ancylostomiasis), *Necator americanus* (new world hookworm), *Trichuris trichiura* (whipworm; causing trichuriasis), etc.

Strongyloidiasis (caused by Strongyloides stercoralis) is kept outside the purview of this discussion.

Pathogenesis

Roundworm eggs are ingested from fecally contaminated soil, and hatch in the small intestine. Emerging larvae traverse the intestinal mucosa, enter the portal and lymphatic circulation and reach the pulmonary vascular bed. They penetrate into the alveoli and later ascend the respiratory tree to the epiglottis and pharynx and are then swallowed. They finally settle in the jejunum where copulation occurs and mature females begin ovipositing within a few months.

Complications include hemoptysis, pneumonia/pneumonitis, bronchospasm, intestinal obstruction, volvulus, intussusception, biliary colic, cholangitis, obstruction of pancreatic duct with pancreatitis, jaundice, hepatic biliary ascariasis, obstruction of appendix with appendicitis. Loeffler syndrome (severe eosinophilia associated with signs and symptoms of pneumonitis) occurs occasionally.

Threadworms are extremely common in children. Development takes place in the small intestine after the ova are swallowed, but the adult worms are found chiefly in the colon. The gravid female worms deposit ova on the perianal skin. The ova are often carried to the mouth on fingertips and below nails – auto-reinfection perpetuates the cycle. Intense itching in the perianal area can be quite distressing.

Whipworms inhabit distal ileum, appendix and colon. Infection occurs through ingestion of food contaminated with ova that have become infective after lying for 3 weeks in moist soil. Infection is usually asymptomatic but **complications** in heavy infection include persistent diarrhea, failure to thrive and rectal prolapse.

Hookworms live, often in large numbers, in the duodenum and upper jejunum. Eggs are passed in stool. Larvae hatch in warm, moist soil and reach the filariform infective stage which penetrates human skin (during barefoot walking on contaminated ground) and are carried to the lungs. They ascend the bronchi, are swallowed and colonize the small intestine. The warms attach themselves to the intestinal mucosa by their mouthparts and draw blood – loss is greater in case of *A. duodenale*.

Iron deficiency anemia (which is chronic and at times severe) is a common **complication** of hookworm infection.

Diagnostic criteria

Clinical:

- History of roundworms in stools or roundworms escaping through the anus or mouth.
- Threadworms seen moving in stool or on the skin upon parting the buttocks.
- Cough, dyspnea, hemoptysis and/or other signs of pneumonitis in roundworm or hookworm infection (when larvae are passing through the lungs).
- Allergic manifestations such as bronchospasm (wheezing), urticaria.
- Vague epigastric pain/discomfort, nausea, vomiting, colicky abdominal pain.
- Ground itch (dermatitis on feet) at the time of hookworm penetration.
- Failure to thrive in case of heavy infection in children.

Investigations:

- Microscopy of fresh stool specimens may reveal typical ova.
- Perianal cellotape smears may demonstrate threadworm ova.
- X-rays of abdomen, ultrasound, cholangiography, barium meal, etc., may demonstrate worms and/or signs of complications.
- Eosinophilia – full blood count for eosinophils.

Referral criteria

- Ascariasis with complications not responding to adequate medical or surgical treatment.
- Severe anemia complicating hookworm infection.

Intestinal nematodes (Worm infestations)		
	Management	**Comments**
Non-drug treatment	Intestinal obstruction may respond to nil per mouth, nasogastric drainage, parenteral fluids and electrolyte correction. If this fails, consider surgical removal of the worms. In hookworm infection, if anemia is severe enough to threaten heart failure, blood transfusion may be needed.	Prevent reinfection by improvement of personal hygiene, washing vegetables and hands before eating, sanitary waste disposal, health education and de-worming.
Drug treatment Anthelmintic treatment:	Mebendazole, oral, 100 mg twice daily for 3 days. May be extended to 5 days in case of trichuriasis. OR Albendazole, oral 1–2 years (< 10 kg), 200 mg as a single dose, > 2 years, 400 mg as a single dose. OR Pyrantel pamoate, oral, 10 mg/kg (base) as a single dose. The suspension can generally be taken with milk or fruit juice.	De-worming is not indicated when intestinal obstruction is suspected. Purging is not necessary prior to or during therapy with any of these agents. Pyrantel is not effective against the whipworm. Anthelmintics may be repeated after 10–14 days in case of threadworm infection to break the auto-reinfection cycle.

Continued

Intestinal nematodes (Worm infestations)		
	Management	**Comments**
Adjunctive treatment Anemia:	Responds well to oral iron in hookworm infection.	
Bacterial pneumonia:	Antibiotics (as appropriate) in the event of bacterial pneumonia complicating the pneumonitis in roundworm or hookworm infection.	
Severe colic:	Dicyclomine, oral, before food 10-20 mg (ADULT), 10 mg (CHILD > 2 years) or 5 mg (CHILD 6 months to 2 years), all three times daily. OR Hyoscine butylbromide, in case of acute cramping pain, IM or IV 20 mg, repeatable after 30 minutes if necessary (ADULT). Not recommended in children.	Consider when subacute intestinal obstruction is associated with colicky pain (worm colic).

Malaria

Definition

Malaria is infection of red blood cells by the protozoan parasite *Plasmodium*, manifesting as fever, anemia and splenomegaly.

Pathogenesis

Malaria is usually spread by the bite of infected female anopheline mosquitoes. Individuals vary in their resistance to infection. Very rarely, the disease is transmitted through transfusion of contaminated blood or from mother to child (transplacental transmission). Four species of malaria parasites can infect man, namely *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale*, and *Plasmodium malariae*.

Although drugs and insecticides have made malaria rare in most developed countries, the disease remains common and deadly in tropical and subtropical areas worldwide. An estimated 300 to 500 million people are infected with malaria, and 1 to 2 million deaths occur each year. Most of these deaths occur in children younger than 5 years of age. Travelers returning from tropical areas can bring the infection with them to non-endemic areas.

The cycle of malarial infection begins when a female mosquito bites a person with malaria and ingests blood that contains gametocyte form of the malarial parasites. Once inside the mosquito, the parasite multiplies and migrates to the mosquito's salivary gland. When the mosquito bites another person, the parasites (sporozoites) are injected along with the mosquito's saliva. Inside the person, the parasites move to the liver and multiply again (pre-erythrocytic schizogony). They typically mature over an average of 1 to 3 weeks, then leave the liver and invade the person's red blood cells as merozoites. The parasites multiply yet again inside the red blood cells (erythrocytic schizogony), eventually causing the infected cells to rupture to release further merozoites. The release of parasite showers into the bloodstream coincides with fever spikes. The erythrocytic cycles take 48 hours in case of both *P. vivax* and *P. falciparum*. In the latter case, cytoadherence of parasitized red cells to the vascular endothelium causes much of the replication to occur in capillaries deep in the body. Also clogging of capillaries can damage many organs – particularly the brain, lungs, and kidneys.

P. vivax and *P. ovale* can remain in the liver in a dormant form (hypnozoites) that periodically releases mature parasites into the bloodstream, causing recurring at-

tacks of symptoms. *P. falciparum* and *P. malariae* do not persist in the liver. However, mature forms of *P. malariae* can persist in the bloodstream for months or even years before causing an attack of symptoms. *P. vivax* and *P. falciparum* are the two species encountered in India.

Diagnostic criteria

***Clinical*:**

- Incubation period: 9 - 14 days (average 12) with *P. falciparum* and 8 - 17 days (average 14) with *P. vivax*.
- Fever, chills and rigor. The fever typically falls after several hours, and heavy sweating occurs. Fevers eventually become periodic, occurring at 48-hour intervals with *P. vivax* and *P. ovale* and at 72-hour intervals with *P. malariae*. In falciparum the fever is often not periodic, but irregular. Temperature spikes can exceed 104° F
- Headache, body aches, and nausea are common.
- As the illness progresses, anemia (hemolytic anemia) develops and the spleen enlarges.

Various **complications** are possible. Hyperpyrexia can lead to febrile convulsions in children. Rapid hemolysis may lead to jaundice. Serious complications of falciparum malaria include:

- Severe anemia: Hemoglobin < 5 g/dL
- Hypoglycemia: May be severe in patients with high parasite counts, particularly if they are treated with quinine.
- Disturbed fluid-electrolyte balance e.g. dehydration, lactic acidosis, hyponatremia.
- Disseminated intravascular coagulation.
- Cerebral malaria: A particularly dangerous complication that can produce high fever, headache, drowsiness, delirium, confusion, seizure, and coma. It most commonly occurs in infants or young children, pregnant women, and people who travel to high-risk areas.
- Renal dysfunction. Blackwater fever is an uncommon complication of falciparum malaria, caused by massive hemolysis and resultant hemoglobinuria. Kidney damage may be severe enough to require dialysis. Blackwater fever is more likely to develop in people who have taken quinine for treatment.
- Pulmonary edema and adult respiratory distress syndrome.
- Secondary bacterial pneumonia.

- Septicemic shock (algid malaria).
- Splenic rupture.
- Repeated generalized convulsions.

***Investigations*:**

- Malaria parasites in blood – thick (confirmation of diagnosis) and thin (species identification) smears; hyperparasitemia indicates > 5% peripheral RBC affected. One negative smear does not exclude diagnosis.
- Rapid diagnostic tests e.g. a plasma reagent dipstick or immunochromatographic test.
- Ancillary investigations for complications e.g. hemoglobin, blood glucose, blood gases, serum electrolytes, etc.

Referral criteria

- All pregnant women.
- Complicated malaria e.g. cerebral malaria
- Malaria not responding to adequate treatment (treatment failure considered if signs and symptoms persist beyond 3 days and patient does not improve).
- Patients with severe acidosis.
- Patients needing respiratory support
- Patients needing dialysis.

Standard treatment guidelines

Where suspicion of malaria is high and laboratory confirmation cannot immediately be obtained, treatment is warranted while waiting for laboratory results. One negative malaria blood test does not exclude the diagnosis. For all severe infections, monitor treatment with periodic blood smears.

Malaria		
	Management	**Comments**
Non-drug treatment All cases	Measures to reduce fever (e.g. tepid sponging and fanning) and adequate hydration is important.	Preventive measures like protective clothing when outdoors in the evenings, bed nets, impregnated bed nets, applying mosquito repellents containing diethyl-toluamide on exposed areas of the skin.
Severe / complicated malaria:	In severe and complicated malaria, it is essential to monitor and maintain fluid balance, acid–base status, electrolytes, blood glucose, liver functions, renal function, blood gases, heart rate, respiratory rate, blood pressure and level of consciousness. Correct hypoglycemia with 50% dextrose. If anemic (Hb £ 7g/dL): Blood transfusion, IV, 10–20 mL/kg over 3 hours. Control convulsions, if necessary. Ventilatory support, if necessary. Nutritional support.	Hospitalization is recommended for severely ill patients with falciparum malaria. If complications develop, admit to an intensive care unit. It is also important to avoid overhydration as this could contribute to the development of respiratory distress syndrome, particularly in pregnancy.
Drug treatment Vivax malaria:	Chloroquine phosphate, oral, 10 mg/kg (as base) immediately and after 24 hours, then 5 mg/kg (as base) after another 24 hours. Preferably after food.	Primaquine should follow treatment with chloroquine for the destroying the hepatic phase of the parasite and preventing relapse (radical cure). It is contraindicated in pregnancy and breast-feeding, in children under 1 year of age and in G6PD deficiency. Testing for G6PD

Continued

Malaria		
	Management	**Comments**
Drug treatment Vivax malaria: (Continued)	FOLLOWED BY Primaquine phosphate, oral, 0.25 mg/kg (as base) daily for 14 days, starting the day after completing chloroquine.	is not mandatory before starting primaquine but in such cases patients should be warned to report in case unusual fatigue or pink / red color urine develops. If partial deficiency is documented, then primaquine may be used in a dose of 0.75 mg/kg (as base) per week for 8 weeks.
Chloroquine sensitive falciparum malaria:	Chloroquine phosphate, oral, as in vivax malaria.	Radical cure is not needed in falciparum malaria. However, primaquine may still be used for its gametocidal action, in a single dose of 0.75 mg/kg, oral. G6PD testing is not required for single dose primaquine.
Chloroquine resistant or suspected chloroquine resistant falciparum malaria	Quinine, oral, 10 mg/kg (as salt) 8 hourly for 7 days. PLUS If quinine resistance is also possible, Doxycycline, oral, 200 mg immediately, starting on day 3 of quinine treatment, and then 100 mg daily for 7 days. IF ORAL MEDICATION IS NOT TOLERATED: Quinine, (1mL = 300 mg quinine salt) IV, may be used initially	Patients should be warned of the possible adverse reactions to quinine. Sulfadoxine 500 mg + Pyrimethamine 25 mg, orally, combination tablet as a single oral dose: 1-4 years 10-19 kg ½ tablet 5–8 years 20-30 kg 1 tablet 9–12 years 31-45 kg 2 tablets > 15 years > 45 kg 3 tablets

Continued

Standard treatment guidelines (continued)

Malaria		
	Management	**Comments**
	Loading dose: 20 mg/kg (as salt) in dextrose 5% in sodium chloride solution 0.9% (5 - 10 mL/kg depending on the patient's fluid balance) over 4 hours Maintenance dose: 8 hours after start of the loading dose, give a maintenance dose of 10 mg/kg (as salt) in dextrose 5% in sodium chloride solution 0.9% (diluted as above) over 4 hours. The maintenance dose should be repeated every 8 hours until the patient can take oral medication. Total duration of treatment should be 7 days.	is an alternative regimen in case quinine is not available. It is contraindicated in pregnancy and in children under 1 year of age. The addition of sulfadoxine/pyrimethamine to quinine may be also indicated if compliance with 7 days of quinine is considered a problem. Monitor for hypoglycemia if quinine infusion is given. Doxycycline is contraindicated in pregnancy, breast-feeding and in children below 8 years.
Severe or complicated falciparum malaria:	Hospitalize and refer to intensive care if necessary.	
Mixed malaria infections:	Treat for falciparum malaria, as above FOLLOWED BY Primaquine phosphate, oral, 15 mg daily for 14 days	
Fever:	Paracetamol, oral, 10 mg/kg 6 hourly. OR Ibuprofen, oral, 400 mg 6 to 8 hourly (ADULT) or 10 mg/kg 6 to 8 hourly (CHILD), preferably after food.	

Continued

Standard treatment guidelines (continued)

Malaria		
	Management	**Comments**
Nausea and vomiting:	Domperidone, oral, 10 - 20 mg (ADULT) or 0.2 to 0.4 mg/kg (CHILD) 6-8 hourly, preferably before food.	
Role of artemisinin derivatives:	Artemisinin derivatives are being increasingly used in resistant and multidrug-resistant falciparum malaria. They are also being used in severe and complicated falciparum malaria where other drugs are not tolerated. These compounds are not recommended for use in malaria due to *P. vivax*, *P. malariae* or *P. ovale* since other effective antimalarial drugs are available for this purpose. Artemisinin itself is poorly soluble in oils or water but the parent compound has yielded dihydroartemisinin, the oil-soluble derivatives artemether (β-artemether) and arteether (α-β arteether), and the more water-soluble derivatives sodium artesunate and artelinic acid. These derivatives have more potent blood schizontocidal activity than the parent compound and are the most rapidly effective antimalarial drugs known. They are not hypnozoiticidal but gametocidal activity has been observed. However, it is important to note that dose finding studies with artemisinin derivatives is still limited and dose recommendations are therefore evolving. Another major concern is that they should probably always be administered in combination with another effective blood schizonticide to prevent	Experience with artemisinin derivatives in pregnancy is limited and currently these drugs should not be used in the first trimester if alternatives are available. Neurotoxicity, manifesting as ataxia, gait disturbances, respiratory depression and convulsions, is common to all artemisinin derivatives in high doses in animal studies. However, there are no reports of serious neurotoxicity in human use. Nevertheless recommended doses should not be exceeded. Although artemether + mefloquine combination therapy is the best studied combination to date, other combination treatments under evaluation include artemether + lumefantrine, artesunate + sulfadoxine-pyrimethamine, artesunate + amodiaquine, and others.

Continued

Standard treatment guidelines (continued)

MALARIA		
	Management	**Comments**
	recrudescence and delay the selection of resistant strains. Monotherapy with oral or intramuscular artemether (with which there is the maximum experience) in a dose of 1-4 mg/kg per day for 3-5 days results in an unacceptable rate of recrudescence. The use of artemether as monotherapy should therefore be limited to specific indications, such as in patients with a history of adverse reactions to the combination drug. When monotherapy is used, a 7-day course is advisable at the current juncture and every effort should be made to ensure adherence. *Artemether, oral* Monotherapy : 4 mg/kg loading dose on the first day, followed by 2 mg/kg once a day for 6 days. Combination therapy : 4 mg/kg once a day for 3 days, plus mefloquine (15 mg or 25 mg of base per kg) as a single dose or in split doses on the third day. *Artemether, intramuscular* 3.2 mg/kg as a loading dose on the first day, followed by 1.6 mg/kg daily for a minimum of 4 days or until the patient can take oral therapy to complete a 7-day course. The daily dose can be given as a single injection. In children, the use of a tuberculin syringe is advisable since the injection volume will be small.	

Continued

Standard treatment guidelines (continued)

MALARIA		
	Management	**Comments**
Role of artemisinin derivatives:	*Artesunate, oral* Monotherapy: 4 mg/kg loading dose on the first day, followed by 2 mg/kg once a day for 6 days. Combination therapy: 4 mg/kg once a day for 3 days, plus mefloquine (15 mg or 25 mg of base per kg) as a single dose or in split doses on the third day. *Artesunate, intramuscular* 2.4 mg/kg initially followed by 1.2 mg/kg at 12 and 24 hours, then 1.2 mg/kg daily for 6 days. If the patient can swallow, the daily dose can be switched to oral. *Arteether, deep intramuscular* Monotherapy: 100 mg (ADULT) or 3 mg/kg (CHILD) once daily for three days. This is the manufacturer recommended regimen. However, experience is very limited to give any firm recommendations at this stage.	

Features indicating poor prognosis in severe falciparum malaria

Clinical	Laboratory
• Deep coma • Agitation • Hyperventilation • Sustained hyperthermia [> 39 °C] • Hypothermia [< 36.5 °C] • Bleeding	• Severe anemia [Packed cell volume < 15%] • Leukocytosis [Total leukocyte count > 12,000 / mL] • Coagulopathy – reduced platelet count [< 50,000 / mL]; increased prothrombin time [> 3 s above control]; increased partial thromboplastin time; reduced fibrinogen [< 200 mg/dL] • Hypoglycemia [< 40 mg/dL] • Raised serum creatinine [> 3.0 mg/dL] • Raised serum bilirubin, total [> 3 .0 mg/dL]; raised liver enzymes [SGPT and SGOT > 3 times upper limit of normal] • Hyperparasitemia – > 50,000 / mL; > 20% red cells parasitized, > 5% neutrophils contain visible pigment

Principles in the management of severe falciparum malaria

- Suspect diagnosis and attempt to confirm the same – however, do not hold back treatment that may be life-saving.
- Make rapid clinical assessment.
- Secure airway and catheterize unconscious patient, start intravenous infusion and other resuscitative measures.
- If possible, transfer to facility with the highest level of intensive care.
- Take blood for grouping and cross-matching, baseline glucose, pH and blood glass analysis.
- Start appropriate antimalarial therapy by the parenteral route.
- Correct fluid / electrolyte / acid-base balance.
- Detect and manage complications like hyperpyrexia, hypoglycemia, etc.
- Treat convulsions (cerebral malaria).
- Nurse the patient appropriately – comatose patients on their side, clear airway, turn frequently.
- Avoid harmful ancillary treatments e.g. Corticosteroids.

Measles

Definition

An acute, highly contagious, viral exanthem, occurring usually in childhood.

Pathogenesis

Infection occurs through exposure to the measles virus via droplet-spread, 9–14 days before the onset of the prodromal phase. It is communicable for about 7 days from the onset of the prodromal phase. Measles is a serious condition in any child, especially in infants under 6 months of age and malnourished or immunocompromised children. One clinical attack confers lifelong immunity.

Complications include pneumonia, laryngotracheobronchitis (croup), encephalitis, stomatitis, feeding difficulties, severe diarrhoea, otitis media and corneal ulceration. Subacute sclerosing panencephalitis is a rare long-term complication.

Diagnostic criteria

- Prodromal (catarrhal) phase: Fever, runny nose (coryza), cough, conjunctivitis, Koplik's spots (small grey-white spots in the oral cavity).
- After 3–5 days, the maculopapular rash appears, starting from the hairline downward to involve the trunk and extremities.
- The rash begins to fade after 3 days, in the order of its appearance.
- If fever is still present after the third day of the rash, a complication should be suspected.

Referral criteria

- Measles in malnourished or immunocompromised children.
- Measles with complications.
- Measles not responding to adequate therapy.

Measles		
	Management	**Comments**
Non-drug treatment	Adequate intake of fluids for proper hydration. Minimal exposure to strong light, if patient is photophobic.	Isolate the patient as measles is highly contagious to non-immunized children.
Drug treatment	There is no specific drug treatment for measles. However, complications like pneumonia and viral encephalitis will require symptomatic drug treatment for which patient should be referred to hospital. For conjunctivitis and corneal dryness: Chloramphenicol eye ointment 1%, apply 6 hourly for 5 days.	
Fever:	Paracetamol, oral, 10 mg/kg 6 hourly. OR Ibuprofen, oral, 400 mg 6 to 8 hourly (ADULT) or 10 mg/kg 6 to 8 hourly (CHILD), preferably after food.	
Cough:	Recommended only for exhausting non-productive cough: Syrup / Linctus preparation containing Dextromethorphan hydrobromide administered orally in a dose of 5 - 7.5 mg dextromethorphan three times daily for CHILD aged 1 to 5 years, and 7.5 - 15 mg three times daily for CHILD aged 6 to 12 years.	Syrup / Linctus preparation containing Codeine phosphate administered orally in a dose of 3 mg codeine three to four times daily for CHILD aged 1 to 5 years, is an alternative to dextromethorphan. However, codeine is liable to cause constipation and drowsiness in young children and so should be avoided if possible.
Preventing Vitamin A deficiency	Vitamin A, oral, < 1 year, 100 000 IU as single daily dose for 2 days, > 1 year, 200 000 IU as single daily dose for 2 days.	

Nephrotic syndrome

Definition

Nephrotic syndrome is characterized by the presence of edema, proteinuria, hypoproteinemia and hyperlipidemia due to increased permeability of the glomerular basement membrane to protein.

Pathogenesis

Minimal change nephrotic syndrome (MCNS) is caused by a decreased negative charge of the glomerular basement membrane. Albumin and other larger protein molecules, which are also negatively charged, are no longer repelled from the basement membrane to the same degree. Abnormally large volumes of albumin and proteins are filtered into the renal tubules, whose reabsorption capacity is exceeded, and are lost in the urine. MCNS usually responds to corticosteroids.

Secondary nephrotic syndrome is caused by various types of immune-complex glomerulonephritis, which not only disrupt the structure of the basement membrane but also decrease its negative charge. The response to corticosteroids varies from poor to absent, depending on the histological diagnosis.

Complications: Infections (primary pneumococcal peritonitis, septicemia, pneumonia and urinary tract infections); hypovolemia and renal insufficiency due to poor renal perfusion; thrombosis; hypertension (not in minimal change disease)

Diagnostic criteria

- Edema.
- Proteinuria in excess of 2 g/m^2/24 hours. Early morning urine protein to creatinine ratio exceeds 0.4 g protein/mmol creatinine.
- Hypoproteinemia, with albumin values below 25 g/L.
- Hyperlipidemia including raised cholesterol.

Idiopathic minimal change disease can be considered in the following circumstances:

- Age 2–6 years.
- No hypertension or renal function impairment.
- No more than mild microscopic hematuria (1–2+ on dipstick).
- Excluded identifiable secondary causes such as hepatitis B, syphilis, systemic lupus erythematosus (SLE), post-streptococcal glomerulonephritis, Henoch-Schönlein syndrome, typhoid.
- Normal serum levels of total hemolytic complement, C3 and C4.

Referral criteria

- To confirm the diagnosis, determine the underlying cause and initiate treatment.
- Steroid-resistant minimal change nephritis.
- Nephrotic syndrome with complications and/or relapses.
- Nephrotic syndrome not responding to adequate therapy.

Nephroitc Syndrome		
	Management	**Comments**
Non-drug treatment	Acute phase: Weigh daily and record intake and output strictly. Fluid restriction is usually not necessary. See comments. Dietary measures: Restrict sodium while edema is present. Normal to high protein diet. Normal calorie intake.	Hypovolemia can frequently be present and lead to oliguria and renal insufficiency. (Anorexia, abdominal discomfort or pain and diarrhoea precede a hypovolaemic crisis.)
Drug treatment Mild to moderate edema:	Spironolactone, oral, 3–5 mg/kg/24 hours in 2-3 divided doses. AND / OR Hydrochlorothiazide, oral, 1–2 mg/kg/24 hours in 2 divided doses. OR Furosemide, oral, 1–5 mg/kg/24 hours in 2–3 divided doses or as a single dose.	Great care must be taken NOT to give diuretics to a volume-depleted child.
Severe edema:	This may be treated by Human albumin infusion followed by carefully titrated loop diuretic therapy. Referral is needed and use must be supervised by a nephrologist	Indications for albumin administration: • edema causing discomfort: ascites, pleural effusions, severely swollen eyelids and labial or scrotal edema; • anorexia, abdominal discomfort or pain and diarrhoea (preceding a hypovolemic crisis). Careful monitoring of electrolyte levels and renal function is mandatory. Intravascular volume must be adequate before diuretic therapy.

Continued

Standard treatment guidelines (continued)

Nephroitc Syndrome		
	Management	**Comments**
Thrombotic complications:	To reduce thrombotic complications during periods of edema: Aspirin soluble, oral, 75–150 mg daily.	
Urine protein loss:	For patients not responding to other measures, angiotensin converting enzyme (ACE) inhibitor therapy may be beneficial. Referral is needed and use must be supervised by a nephrologist.	Fluid status and renal function must be monitored closely as the use ACE inhibitors in a volume-depleted patient can aggravate renal function impairment.
Prophylaxis for pneumococcal infections:	Amoxicillin, oral, 125–250 mg twice daily during periods of edema.	All nephrotic patients once in remission: Pneumococcal vaccine, IM, 0.5 mL (single dose). Current vaccine to be used in CHILD > 2 years old.
Specific drug therapy:	Where minimal change disease is proven or highly probable: Prednisolone, oral, 60 mg/m^2/24 hours or 2 mg/kg/24hours as a single morning dose (maximum 60 mg per 24 hours) for 4-6 weeks. Then the same dose on alternate days for another 4 weeks, tapered over the following 2 weeks and stopped.	Steroid supplementation should be given during periods of severe illness or surgery for up to 12 months following a course of steroids lasting 14 days or more. Various regimens may be used.

Continued

	Management	Comments
Relapses:	Each relapse that occurs more than 30 days after discontinuation of treatment is treated similarly to the initial episode, except that the daily steroid dose is changed to alternate days as soon as the urine has been protein-free for 3-5 days. (It does not have to be continued for 4-6 weeks). Patients who relapse frequently (≥ 3 times in 6 months) should be referred to a nephrologist to undergo further management guided by renal biopsy.	To minimize unnecessary morbidity and perhaps prevent hospitalization, the caregiver should be taught to test for proteinuria and report increases to the doctor. 1–2+ proteinuria may resolve spontaneously, especially if associated with an intercurrent infection and treated with antibiotics. 3-4+ proteinuria almost never remits spontaneously and almost always implies a relapse, especially if the serum albumin is starting to fall. Treatment should be started immediately.
Steroid dependence:	Patients who relapse on changing to alternate-day steroids should be maintained on daily steroids, and the dose tapered to the minimum effective level. Alternatively, a higher dosage of alternate-day steroids can be tried (maximum 80 mg/dose), the dose tapered (to about 0.6 mg/kg on alternate days) and held for 3–6 months before further tapering. Patients who relapse within 30 days after withdrawing alternate-day steroids should be maintained on an alternate-day regimen and the dose tapered to the minimum effective level.	

Otitis media, Acute

Definition

Acute otitis media is acute inflammation of the middle ear resulting from infection by viruses or bacteria, often as a complication of the common cold.

Pathogenesis

Pathogenic micro-organisms from the nasopharynx reach the middle ear ascending via the eustachian tube. Infection and inflammation may spread to all other adjacent anatomical structures with suppuration, bone necrosis or septic thrombophlebitis. Micro-organisms involved include pneumococci, streptococci, *Haemophilus influenzae*, staphylococci, *Branhamella catarrhalis*, *Pseudomonas aeruginosa*, and anaerobes.

Complications include acute mastoiditis, meningitis, extradural abscess, brain abscess (temporal lobe and cerebellum), labyrinthitis, lateral sinus thrombosis, cranial nerve paralysis, and petrositis.

Diagnostic criteria

***Clinical*:**

- Acute otitis media is more common in children than in adults.
- It is a common sequel to other upper respiratory tract infections
- The infected ear is acutely painful, with a red, bulging eardrum.
- The patient may be quite unwell systemically with fever and tachycardia; children may be inconsolable.
- Eardrum rupture may occur producing a bloodstained discharge with relief of pain.
- Adults may additionally complain of vertigo.
- Hearing may remain muffled for up to one month or more in adults.
- Children may suffer from recurrent attacks that may be associated with a persistent middle ear effusion.
- A large eardrum perforation may fail to heal completely leaving a residual central perforation.

***Investigations*:**

- The diagnosis is usually clinical. Routine use of aural swabs is not recommended.
- Various imaging investigations may be needed to check for complications.

Referral criteria

- Otitis media where intracranial suppuration is suspected.
- Otitis media with other complications.
- Otitis media with persistent middle ear effusion.
- Otitis media with non-healing eardrum perforation.

Acute Otitis Media		
	Management	**Comments**
Non-drug treatment	Acute otitis media necessitates rest. Discharging ear should be mopped with cotton wicks and kept dry. Ear buds should not be used. Maintain adequate hydration and nutrition.	If otitis media recurs and is associated with a persistent middle ear effusion (glue ear), referral to an ENT surgeon is necessary for myringotomy and grommet insertion.
Drug treatment Antibiotic treatment:	Amoxicillin, oral, preferably after food < 20 kg, 10 mg/kg 8 hourly, for 5-10 days > 20 kg, 250–500 mg 8 hourly, for 5-10 days. OR Azithromycin, oral, 500 mg (ADULT) or 10 mg/kg (CHILD) daily as single dose for 3 days. OR Amoxicillin + Clavulanate (Co-amoxiclav), oral, 500 mg + 125 mg (ADULT) or 10 mg/kg in terms of amoxicillin base (CHILD) 8 hourly for 5-10 days. By IV injection, in terms of amoxicillin base, 1 g 8 hourly (ADULT) or 25 mg/kg (CHILD) 8 hourly – may be given 6 hourly in serious infections. OR Cefalexin, oral, 500 mg (ADULT) or 250 mg (CHILD 6 to 12 y) or 125 mg (CHILD 1 to 5 y) 8 hourly for 5-10 days. For infants 125 mg 12 hourly is the dose. All doses may be doubled in severe infection.	Most people with acute otitis media get better on their own. However, because it is hard to predict who will not improve, doctors offer antibiotics to all patients. If neglected chronic inflammation or one of the complications may develop. If no abscess is present, the antibiotic usually starts to clear the infection in 24 to 48 hours. If mastoiditis is suspected to be developing (persistent fever, severe pain, increasing deafness, tenderness over mastoid antrum) the patient should be referred to the ENT surgeon. Azithromycin is a good choice in penicillin allergic patients. Cefadroxil is an alternative to Cefalexin. Dose is, oral, 500 mg (ADULT) or 250 mg (CHILD 6 to 12 y) or 125 mg (CHILD 1 to 5 y) 12 hourly. All doses may be doubled in severe infection.

Continued

Standard treatment guidelines (continued)

Acute Otitis Media		
	Management	**Comments**
Nasal decongestant:	If the nose remains persistently blocked, normal saline instilled into the nasal passages repeatedly will help liquefy mucus.	Sympathomimetic nasal decongestants are liable to cause rebound nasal congestion and are therefore not recommended routinely.
Analgesic, antipyretic and anti-inflammatory agent:	Paracetamol, oral, 10 mg/kg 6 hourly. OR Ibuprofen, oral, 400 mg 6 to 8 hourly (ADULT) or 10 mg/kg 6 to 8 hourly (CHILD), preferably after food.	

Otitis media, Chronic

Definition

Chronic otitis media is a long-standing infection of the middle ear, often discharging due to perforation of the eardrum.

Pathogenesis

Chronic otitis media is caused by a tympanic perforation or a noncancerous growth of white skinlike material (cholesteatoma). People may have a perforation without ever getting any symptoms, but sometimes a chronic bacterial infection develops.

Chronic otitis media may flare up after an infection of the upper respiratory tract, such as the common cold, or after water enters the middle ear while bathing or swimming. Persistent flare-ups may result in the formation of protruding growths (polyps), which extend from the middle ear through the perforation and into the ear canal.

Persistent infection can destroy parts of the ossicles causing conductive hearing loss. Other serious **complications** include inflammation of the inner ear (labyrinthitis), facial paralysis, and brain infections. Some people with chronic otitis media develop cholesteatomas in the middle ear. Cholesteatomas, which destroy bone, greatly increase the likelihood of other serious complications such as mastoiditis, lateral venous sinus thrombosis, meningitis and intracranial abscess.

Diagnostic criteria

***Clinical*:**

- Chronic discharge of clear fluid or mucopus. Aural discharge may be scanty but offensive in atticoantral disease.
- Acute flare-ups usually result in a painless discharge of pus, which may be malodorous, from the ear.
- Occasionally the acute flare-ups may be accompanied by pain and fever. This is usually secondary to obstruction of drainage inviting secondary bacterial infection.
- Conductive hearing loss.
- Otoscopy enables distinction between tubotympanic disease and the more serious atticoantral disease. Detection of cholesteatoma suggests unsafe type chronic suppurative otitis media (CSOM) as various complications are possible.

***Investigations*:**

- The diagnosis is usually clinical. Routine use of aural swabs is not recommended.
- Various imaging investigations may be needed to check for complications if cholesteatoma is detected.

Referral criteria

- Otitis media where intracranial suppuration is suspected.
- Otitis media with other complications.
- Otitis media with persistent middle ear effusion.
- Otitis media with non-healing eardrum perforation.

Chronic Otitis Media		
	Management	**Comments**
Non-drug treatment	Discharging ear should be mopped with cotton wicks and kept dry. Ear buds should not be used. Change 3 or 4 times daily till dried up. If symptoms not responding within reasonable time, REFER to otorhinolaryngologist for aural toilet and surgical interventions as required. Surgical interventions often include such as mastoidectomy.	Avoid antibiotics at the onset. Many cases of CSOM resolve with only local care. REFER immediately if atticoantral disease (unsafe type CSOM) is suspecetd.
Drug treatment Antibiotic treatment:	See acute otitis media.	If pain and fever develops and does not resolve with symptomatic treatment in reasonable time, treat as for acute otitis media.
Nasal decongestant:	If the nose remains persistently blocked, normal saline instilled into the nasal passages repeatedly will help liquefy mucus.	Sympathomimetic nasal decongestants are liable to cause rebound nasal congestion and are therefore not recommended routinely.
Analgesic, antipyretic and anti-inflammatory agent:	Paracetamol, oral, 10 mg/kg 6 hourly. OR Ibuprofen, oral, 400 mg 6 to 8 hourly (ADULT) or 10 mg/kg 6 to 8 hourly (CHILD), preferably after food	

Otitis media, Serous

Definition

Serous otitis media, also called otitis media with effusion or glue ear, is persistent accumulation of fluid in the middle ear.

Pathogenesis

Serous otitis media can develop from acute otitis media that has not completely cleared or from a blocked Eustachian tube. Allergies are a common cause of Eustachian tube blockage. Serous otitis media can occur at any age but is particularly common in children.

Normally, pressure in the middle ear is equalized frequently with atmospheric pressure as the Eustachian tube opens during swallowing. If the Eustachian tube is blocked, pressure in the middle ear tends to decrease as oxygen is absorbed into the bloodstream. As the pressure decreases, fluid accumulates in the middle ear, reducing the eardrum's ability to move. The fluid may be serous, mucoid or highly viscid in nature. Usually, but not always, the fluid contains some bacteria, but symptoms of active infection (such as redness, pain, and pus) are rare.

Complications include acute mastoiditis, meningitis, extradural abscess, brain abscess (temporal lobe and cerebellum), labyrinthitis, lateral sinus thrombosis, cranial nerve paralysis, and petrositis.

Diagnostic criteria

Clinical:

- Serous otitis media is a common sequel to acute otitis media or nasal allergy. It is commoner in children.
- Patient usually notices a fullness in the affected ear and may hear a popping or crackling sound when they swallow.
- Partial hearing loss commonly develops (usually muffling – equivalent to blocking the ear canal with the index finger).
- The affected ear may be painful but acute otalgia is not present. The pain may be recurring intermittently.
- On otoscopy the eardrum is retracted and with a dull yellowish appearance because of the fluid behind it. The diagnosis is conclusively established when the fluid persists for more than 12 weeks.

Investigations:

- The diagnosis is usually clinical.
- Tympanometry reveals a flat trace and a conductive hearing loss.

Referral criteria

- All diagnosed cases should be referred to the ENT surgeon as medical management of serous otitis media is usually not successful.

Serous Otitis Media		
	Management	**Comments**
Non-drug treatment	The definitive treatment is myringotomy, aspiration of the fluid and insertion of a ventilation tube (grommet) through the eardrum. The grommet is spontaneously extruded after some months. If effusion keeps recurring, adenoidectomy may also be indicated.	Since Eustachian tube dysfunction is the primary pathology, low pressure in the middle ear can be temporarily increased by repeated Valsalva maneuvers (forcing breathing with pinched nostrils and closed mouth).
Drug treatment Antibiotic treatment:	Amoxicillin, oral, preferably after food < 20 kg, 10 mg/kg 8 hourly, for 5-10 days > 20 kg, 250–500 mg 8 hourly, for 5-10 days. OR Azithromycin, oral, 500 mg (ADULT) or 10 mg/kg (CHILD) daily as single dose for 3 days.	Antibiotics are indicated only if infection is suspected. Any improvement will be short-lasting.
Antiallergic:	Promethazine, oral, ADULT 10-20 mg 2-3 times daily; CHILD under 2 years not recommended; CHILD 2-5 years 5-15 mg daily in divided doses; CHILD above 5 years 10-25 mg daily in divided doses. OR	Indicated only if an allergic component is suspected. Again, any improvement will be temporary.

Continued

Standard treatment guidelines (continued)

Serous Otitis Media		
	Management	**Comments**
Antiallergic: (Continued)	Cetirizine, oral, ADULT 10 mg once daily; CHILD under 2 years not recommended; CHILD 2-5 years 5 mg once daily or 2.5 mg twice daily; CHILD above 5 years 10 mg once daily or 5 mg twice daily.	
Analgesic:	Paracetamol, oral, 10 mg/kg 6 hourly. OR Ibuprofen, oral, 400 mg 6 to 8 hourly (ADULT) or 10 mg/kg 6 to 8 hourly (CHILD), preferably after food.	

Pediculosis (Lice infestation)

Definition

Pediculosis is a contagious ectoparasite infestation of scalp and body hair caused by different varieties of louse.

Pathogenesis

Lice are barely visible wingless insects that spread easily from person to person by body contact and shared clothing and other personal items. Female louse attaches eggs firmly to body hair (close to the skin) or folds of clothing; nymphs hatch, develop into adult lice in about 3 weeks; both suck blood several times during the day. Three species of lice inhabit different parts of the body:

Head lice (*Pediculus humanus capitis*) infest the scalp hair. The infestation is spread by personal contact and possibly by shared combs, brushes, hats, and other personal items. Head lice are a common scourge of school children of all social strata.

Body lice (*Pediculus humanus corporis*) usually infest people who have poor hygiene and those living in overcrowded conditions. They live in the seams of garments that are in contact with the skin.

Pubic lice or crab lice (*Phthirus pubis*) infest the genital hairs, are typically spread during sexual contact. They may also infest the chest hair, underarm hair, beard hair, eyebrows, and eyelashes as well.

Diagnostic criteria

***Clinical*:**

- Itching in the infested area. Intense scratching often breaks the skin, which can lead to bacterial infections. However, children may hardly notice head lice or may have only a vague scalp irritation.
- Lice themselves are sometimes hard to find, but their eggs are readily apparent. Female lice lay shiny grayish white eggs (nits) that can be seen as tiny globules firmly stuck to hairs near their base. With chronic scalp infestations, the nits grow out with the hair and therefore can be found some distance from the scalp, depending on the duration of the infestation. Nits are distinguished from other foreign material present on hair shafts by the fact that they are so strongly attached. Adult body lice and their eggs also may be found in the seams of clothing worn close to the skin.
- Family members may be infested together.

***Investigations*:**

- Diagnosis is usually clinical and no special investigations are required.

Referral criteria

- Lice infestation not responding to usual treatment.

Pediculosis (Lice Infestation)		
	Management	**Comments**
Non-drug treatment	Easiest solution, not always acceptable, is to shave the head or affected areas. Advice regarding personal hygiene (e.g. daily bath) is important. Hair should be washed daily and combed with a fine comb After a drug application, nits must be removed manually, because drugs do not kill all nits and it is not possible to distinguish between living and dead nits. Removal requires a fine-tooth comb and careful searching. The nits of body lice are destroyed simply by throwing away infested clothing.	Sources of infestation (combs, hats, clothing, and bedding) should be decontaminated by wet laundering or dry cleaning.
Drug treatment Pediculocidal treatment :	Gamma-benzene-hexachloride, 1% lotion, is applied to scalp and hair, left on and washed off after 24 hours. Long scalp hair may be kept covered with a plastic cap in the interim. OR Permethrin 1% cream rinse, is an alternative, albeit more costly, to BHC. Approximately, 30 g (in ADULT) is massaged into the scalp and left on for at least 15 minutes before washing off. All louse treatments are repeated in 7 to 10 days to kill newly hatched lice.	Pediculosis should be treated using lotion, liquid or cream rinse formulations. Shampoos are usually diluted too much in use to be effective. A contact time of 12 hours or overnight treatment is required for lotions or liquids – shorter treatment is effective for adult lice but nit nits. Shorter treatment suffices for cream rinse formulations. Avoid using topical preparations on excoriated and secondarily infected skin. Avoid contact with eyes and mucus membranes. In case of pubic louse, not only the pubic area but the whole body should be treated for 12 hours or overnight. People who had sexual contact with the subject should be treated as well.

Continued

Standard treatment guidelines (continued)

Pediculosis (Lice Infestation)		
	Management	**Comments**
Secondary bacterial infections:	Treat as for impetigo.	Impetigo of the scalp is a common sequel to head lice infestation.

Pharyngitis and Tonsillitis

Definition

Pharyngitis is inflammation of the soft tissues of the throat. It is a common presentation of upper respiratory tract infection and, like common cold, appears to be predisposed by abrupt temperature changes. Pharyngitis may be viral in nature, and less commonly bacterial.

Tonsillitis or tonsillar cellulitis is a bacterial infection of the tissues around the tonsils; a tonsillar abscess is a collection of pus in the area of the tonsils.

Pathogenesis

Sometimes, bacteria, usually streptococci, that infect the throat can spread deeper into the surrounding tissues of the tonsils to produce cellulitis. If the bacteria grow unchecked, a collection of pus (abscess) may form. Abscesses may form next to the tonsils (peritonsillar abscess or quinsy) or in relation to the posterior or lateral pharyngeal walls (retropharyngeal or parapharyngeal abscess). Abscesses occur in children but are more common in young adults.

Complications include acute peritonsillar abscess and other abscesses. Untreated streptococcal pharyngitis / tonsillitis may lead to rheumatic fever in children. Streptococcal sore throat can also predispose to acute glomerulonephritis.

Diagnostic criteria

Clinical:

- Throat irritation (sore throat).
- Malaise, feverishness, loss of taste and mild cough (usually non-productive).
- Involvement of the tonsils causes tonsillar enlargement, general redness and swelling around the tonsils and on the soft palate and more acute systemic symptoms.
- White patches may be noted on the tonsils (follicular tonsillitis).
- Cervical lymph nodes, particularly the submandibular group, may be enlarged. The lymphadenopathy can be tender.
- With the development of quinsy, swallowing causes severe pain. Spasms of the chewing muscles make opening the mouth difficult (trismus). A person feels ill, has a fever, and may tilt his head toward the side of the abscess to help relieve pain. An abscess pushes the tonsil forward, and the uvula is also swollen and can be pushed to the side opposite the abscess.
- Possibility of glandular fever (infectious mononucleosis) and diphtheria must be kept in mind.

***Investigations*:**

- The diagnosis is usually clinical. Routine use of throat swabs is not recommended.
- Blood tests for infectious mononucleosis may be required for distinction.
- If not sure whether an abscess is present, soft tissue X-rays or computed tomography (CT) can be used to identify one.

Referral criteria

- Tonsillitis with complications (surgical drainage of pus may be indicated).
- Recurrent peritonsillar abscess.
- Any suspicion of diphtheria requires immediate referral for diphtheria antitoxin treatment.

Pharyngitis and Tonsillitis		
	Management	**Comments**
Non-drug treatment	Acute tonsillitis necessitates rest. Warm saline gargles three to four times daily are soothing in the acute stage. Maintain adequate hydration and nutrition.	Peritonsillar abscesses tend to recur; recurrences can be prevented by removing the tonsils (tonsillectomy) which is usually performed 4 to 6 weeks after the infection has subsided or earlier if the infection is not controlled with antibiotics.
Drug treatment Antibiotic treatment:	Amoxicillin, oral, preferably after food < 20 kg, 10 mg/kg 8 hourly, for 5-10 days > 20 kg, 250–500 mg 8 hourly, for 5-10 days. OR Azithromycin, oral, 500 mg (ADULT) or 10 mg/kg (CHILD) daily as single dose for 3 days. OR Amoxicillin + Clavulanate (Co-amoxiclav), oral, 500 mg + 125 mg (ADULT) or 10 mg/kg in terms of amoxicillin base (CHILD) 8 hourly for 5-10 days. By IV injection, in terms of amoxicillin base, 1 g 8 hourly (ADULT) or 25 mg/kg (CHILD) 8 hourly – may be given 6 hourly in serious infections. OR Cefalexin, oral, 500 mg (ADULT) or 250 mg (CHILD 6 to 12 y) or 125 mg (CHILD 1 to 5 y) 8 hourly for 5-10 days. For infants 125 mg 12 hourly is the dose. All doses may be doubled in severe infection.	Antibiotics are not needed in simple pharyngitis as it is usually viral and self-limiting. Antibiotics may be indicated for patients with more severe symptoms or with a history of otitis media, where streptococcal infection is suspected. Antibiotics are not indicated in glandular fever (infectious mononucleosis). In severe tonsillar infections, it may be necessary to start treatment with parenteral antibiotics. If no abscess is present, the antibiotic usually starts to clear the infection in 24 to 48 hours. If an abscess is present, it must be drained. The area is first numbed with an anesthetic spray or injection. Treatment with antibiotics is continued by mouth. Azithromycin is a good choice in penicillin allergic patients. Cefadroxil is an alternative to Cefalexin. Dose is, oral, 500 mg (ADULT) or 250 mg (CHILD 6 to 12 y) or 125 mg (CHILD 1 to 5 y) 12 hourly. All doses may be doubled in severe infection.

Continued

Standard treatment guidelines (continued)

Pharyngitis and Tonsillitis		
	Management	**Comments**
Analgesic, antipyretic and anti-inflammatory agent:	Paracetamol, oral, 10 mg/kg 6 hourly. OR Ibuprofen, oral, 400 mg 6 to 8 hourly (ADULT) or 10 mg/kg 6 to 8 hourly (CHILD), preferably after food.	

Pneumonia, Community acquired

Definition

Acute inflammation of the lung parenchyma, usually as a result of microbial invasion. Community acquired pneumonia (CAP) is generally less virulent and more likely to respond to standard antimicrobial therapy.

Pathogenesis

Micro-organisms gain entry to the lungs via the airways, bloodstream, aspiration of foreign material or, in neonates, via the transplacental route and during delivery. Virtually any micro-organism may produce lung infection under appropriate circumstances.

CAP occurs more frequently in very young and very old people. The causative organism is usually transmitted from person to person in tiny airborne droplets spread by coughing. *Streptococcus* is the most common bacterial cause of CAP. Other causes include *Haemophilus influenzae*, *Legionella pneumophila*, *Mycoplasma pneumoniae*, *Chhlamydia* spp., and viruses. Staphylococci, which are often a cause of hospital-acquired pneumonia, seldom cause CAP.

Pneumococcal pneumonia, caused by *Streptococcus pneumoniae*, usually starts after an upper respiratory tract viral infection (coryza or influenza) damages airway defenses enough to allow bacteria to infect the area. Although usually treatable, it can be lethal, especially in the very young, the very old, and those people who have other severe illnesses. Pleural effusion, empyema, pneumothorax, lung abscess and pneumococcal septicemia can occur as **complications**. Rarely, the infection can spread to the meninges, causing pneumococcal meningitis and leading to confusion, a stiff neck, seizures, and possibly coma.

Haemophilus influenzae type b strains are the most virulent and cause serious disease, including meningitis, epiglottitis, and pneumonia, usually in children younger than 5 years. The use of *Haemophilus influenzae* type b vaccine, can reduce the incidence of serious disease but infection may still be caused by non-vaccine strains.

Pneumonia caused by *Mycoplasma pneumonia* and *Chlamydia* spp. are categorized as atypical pneumonia. They account for a substantial proportion of CAP cases between 5 - 35 years of age. The course of disease is generally milder than typical bacterial pneumonia, although acute symptoms can last for 1 - 2 weeks. X-rays show evidence of pneumonia, but the diagnosis of *Mycoplasma* or *Chlamydia* as the cause can only be established by blood tests and tests of sputum samples that are only performed in research laboratories.

Viral pneumonias: Many viruses can infect the lungs, causing viral pneumonia. Influenza viruses types A and B, varicella-zoster virus, parainfluenza virus, respiratory syncytial virus, and adenovirus can cause pneumonia, often more commonly in children and people who are very old. The measles virus may also cause pneumo-

nia, especially in malnourished children. People of any age who have an impaired immune system may develop severe pneumonia from cytomegalovirus infection.

Diagnostic criteria

***Clinical*:**

- Shaking and chills are followed by a fever, a productive cough, shortness of breath, and chest pain on the side of the affected lung when breathing.
- Tachypnea [infants less than 2 months > 60/min, between 2 to 12 months > 50/min, and between 1 to 5 years > 40/min]
- The sputum is often rust-colored from presence of blood.
- Nausea, vomiting, fatigue, and muscle aches are also common.
- In children dyspnea, chest indrawing, intercostal retraction, flaring of alae nasi and cyanosis in severe cases, along with feeding difficulties and drowsiness.
- Chest auscultation will reveal variable number of inspiratory or expiratory rhonchi, and crepitations over the affected lobes. Pleural rub or evidence of pleural effusion may be present.
- Viral pneumonias cause cough, which may be non-productive of sputum or produce whitish sputum. The cough can linger long after the infection has resolved. Many patients develop headache, fever, and muscle aches which can last for several days. Clinical distinction between viral and bacterial pneumonias is however very difficult.

***Investigations*:**

- Chest X-rays reveal pneumonic consolidation. However, at the onset the X-ray changes may be unimpressive, and may only develop fully after a few days.
- Sputum culture may reveal the presence of the causative organism.
- Blood counts will show evidence of infection in bacterial pneumonias.
- Definitive diagnosis of viral pneumonias is difficult. X-rays show a less dense pattern of infection than that seen with bacterial pneumonias. Stains of respiratory secretions can be used to detect some viruses, such as respiratory syncytial virus and influenza. It is also possible to show elevations of antibodies to specific viruses, but usually the person has recovered by the time the results are positive.

Referral criteria

- Neonates with pneumonia.
- Severe pneumonia, possibly requiring admission to an intensive care unit.
- Patients requiring ventilatory support.
- Severe viral pneumonias.
- Empyema, massive pleural effusion, severe hemoptysis or other complications difficult to manage.
- Extra-thoracic septic complications e.g. meningitis.
- Pneumonia not responding to standard antimicrobial therapy.

Community Acquired Pneumonia		
	Management	**Comments**
Non-drug treatment	Bed rest. Adequate fluid and nutritional replacements. Baseline and post-treatment chest X-rays are always indicated to ensure complete resolution of the pneumonia. Avoid breast or bottle feeding in infants with a respiratory rate > 60 / min. Small frequent feeds by nasogastric tube if necessary. If enteral feeds are not tolerated, IV fluids/alimentation must be considered.	Frequent monitoring of temperature, blood pressure and pulse rate in order to detect complications early and to monitor response to therapy. Oxygen via nasal prongs or face mask may be needed in severe cases.
Drug treatment	Co-trimoxazole, oral, ADULT: 960 (1440 mg in more severe cases) 12 hourly; CHILD 6 weeks to 5 months: 120 mg 12 hourly, 6 months to 5 years: 240 mg 12 hourly, 6 to 12 years 480 mg 12 hourly, for 7-10 days. OR Amoxicillin, oral, after food; IM or slow IV in severe cases ADULT: 500-1000 mg 8 hourly; CHILD: 20-30 mg/kg 8 hourly, for 7-10 days. OR	Choice of antibiotic depends on suspected causative organism, age of the patient, underlying predisposing factors, and immune status. Initiate antibiotic therapy empirically and reassess if there is no improvement within 48–72 hours. For children and infants beyond the neonatal period, parenteral or oral antibiotic therapy depends on the severity of the disease and the ability of patient to take enteral feeds and medications. Specimens (e.g. blood, sputum, tracheal aspirates) for microscopy, stain, culture and sensitivity testing must be collected before initiating antibiotic therapy.

Continued

Standard treatment guidelines (continued)

Community Acquired Pneumonia		
	Management	**Comments**
Drug treatment (Continued)	Cefalexin, oral, ADULT: 500 mg 8 hourly; CHILD 1 to 5 years 125 mg 8 hourly, 6 to 12 years 250 mg 8 hourly, for 7-10 days. For infants 125 mg 12 hourly is the dose. All doses may be doubled in severe infection. OR Benzylpenicillin, IM or slow IV, after reconstitution as per manufacturer's instructions and appropriate skin test ADULT: 600-1200 mg 6 hourly; CHILD 1month to 12 years 25 mg/kg 6 hourly, for 7-10 days. [600 mg° 1,000,000 U i.e. 1 Mega Unit]	Duration of antibiotic therapy is guided by clinical response, but should not be less than 7–10 days. In atypical pneumonias two weeks of erythromycin is recommended. Prolonged fever and clinical signs may be due to incorrect choice of antibiotic, any of the complications or due to an underlying bronchus obstruction (foreign body or carcinoma). These patients should be further investigated. It is preferable to restrict Benzylpenicillin (Penicillin G) use to classical lobar pneumonia in patients above 5 years. Use by parenteral route. Erythromycin (see below for dose) is a good alternative in patients allergic to penicillin. Another alternative is Ceftriaxone, IM or slow IV, 20–50 mg/kg/day (including infants) as single or two divided doses for 7-10 days.
Severe pneumonia – initial empirical treatment:	Cefuroxime, IM or slow IV (single doses > 750 mg, IV only), ADULT: 750-1500 mg 8 hourly; CHILD: 20-40 mg/kg 8 hourly. PLUS Erythromycin, oral, ADULT: 500 mg 6 hourly; CHILD: 10 mg/kg 6 hourly.	

Continued

Community Acquired Pneumonia		
	Management	**Comments**
Gram negative bacteria, especially in elderly people:	Ofloxacin, oral, ADULT: 200-400 mg 12 hourly for 7-14 days. Not recommended in children below 12 years age. OR Ampicillin, IM or slow IV, ADULT: 500-1000 mg 6 hourly; CHILD less tha 10 years 250-500 mg 6 hourly, for 7-14 days. PLUS Gentamicin, IM or slow IV, ADULT: 1-1.5 mg/kg 8 hourly; CHILD 2 weeks to 12 years 2 mg/kg 8 hourly, for 7-14 days.	Frequent monitoring of temperature, blood pressure and pulse rate in order to detect complications early and to monitor response to therapy. Oxygen via nasal prongs or face mask may be needed in severe cases.
Atypical pneumonia:	Erythromycin, oral, ADULT: 500 mg 6 hourly; CHILD 10 mg/kg 6 hourly for 14 days.	Alternative to erythromycin: Doxycycline, oral, 200 mg immediately, followed by 100 mg twice daily for 7-14 days. Not indicated in children below 8 years.
Antipyretic/ analgesic/ anti-inflammatory:	Paracetamol, oral, 10 mg/kg 6 hourly. OR Ibuprofen, oral, 400 mg 6 to 8 hourly (ADULT) or 10 mg/kg 6 to 8 hourly (CHILD), preferably after food.	

Scabies

Definition

Scabies is a contagious cutaneous parasitosis caused by the itch mite *Sarcoptes scabiei.*

Pathogenesis

The infestation spreads easily from person to person on physical contact, often spreading through an entire household. In rare cases, mites can be spread on clothing, bedding, and other shared objects, but their survival is brief, and normal laundering destroys them.

The female itch mite tunnels in the stratum corneum and deposits her eggs in burrows. Young mites (larvae) then hatch in a few days. The infestation causes intense itching, probably from an allergic reaction to the mites. People with a weakened immune system may develop severe infestations, which produce large areas of thickened, crusted skin.

Diagnostic criteria

***Clinical*:**

- Incubation period is 6 - 8 weeks.
- Intense itching, usually worse at night, is the hallmark.
- The burrows of the mites are often visible as thin lines up to ½ inch long, sometimes with a tiny bump at one end. Sometimes, only the papules are seen, many of which are scratched open and secondarily infected because of the itching. The burrows can be anywhere on the body except the face. Common sites are the webs between the fingers and toes, the wrists, ankles, buttocks, and, in males, the genitals. Over time, the burrows may become difficult to see because they are obscured by inflammation induced by scratching.
- Whole family is often infested together.

***Investigations*:**

- Diagnosis is usually clinical but confirmation may be obtained by scraping the end of the burrows and examining scrapings microscopically for the presence of mites, eggs, or mite feces.

Referral criteria

- Scabies not responding to usual treatment.

Scabies		
	Management	**Comments**
Non-drug treatment	Advice regarding personal hygiene (e.g. daily bath) is important.	Clothing and bedding used during the preceding few days should be subject to hot laundering and dried in the sun.
Drug treatment Acaricidal treatment:	After a soap bath, dry the skin and apply: Gamma-benzene-hexachloride, 1% lotion or cream, to every inch of body below the chin and wash off after 24 hours. In children 1 - 6 months of age, wash off after 8 - 12 hours. Not recommended for newborns. Application needs to be extended to scalp, neck and ears if these areas are involved (more likely in children). OR Ivermectin, oral, 150 microgram/kg – two doses given a week apart is an effective alternative and is especially helpful for severe infestations in immunocompromised patients. It is not recommended for children < 5 years age or < 15 kg body weight.	Benzyl benzoate emulsion has been widely used topical treatment for scabies. However, it is irritant and not recommended for young children. It is also less effective and up to 3 applications on consecutive days may be required. Permethrin, 5% cream, is an alternative, albeit more costly, to BHC. It is left overnight (at least 8 hours) and then washed off. Application needs to be extended to scalp, neck and ears if these areas are involved (more likely in children). Avoid using topical preparations on excoriated and secondarily infected skin. Avoid contact with eyes and mucus membranes. Advise patients to reapply topical preparations to the hands, if they are washed within 8 hours after application. A second application a week later may improve cure rates. Family members and people who have had close physical contact, such as sexual contact, with a scabies patient, should be treated as well.
Secondary bacterial infections:	Treat as for impetigo.	

Continued

Standard treatment guidelines (continued)

Scabies		
	Management	**Comments**
Pruritus:	Promethazine, oral, ADULT 25 mg at bedtime, increased to 25 mg twice daily if needed. CHILD under 2 years not recommended; CHILD 2-5 years 5-15 mg daily in divided doses; CHILD above 5 years 10-25 mg daily in divided doses. OR Cetirizine, oral, ADULT 10 mg once daily; CHILD under 2 years not recommended; CHILD 2-5 years 5 mg once daily or 2.5 mg twice daily; CHILD above 5 years 10 mg once daily or 5 mg twice daily.	Even after successful treatment, itching may persist for up to 2 weeks or longer because of a continued allergic reaction to the mite bodies, which remain in the skin for a while. However, persistent itching might also indicate that scabies eradication was not successful.

Sinusitis, Acute

Definition

Acute inflammation of the mucosal lining of the paranasal air sinuses.

Pathogenesis

Acute sinusitis is commonly a sequel to viral upper respiratory tract infection. However dental disease, facial trauma and neoplasia may be predisposing factors. The maxillary, frontal and sphenoidal sinuses drain into the nasal fossae via the ethmoidal sinuses. Thus conditions in the nose, particularly the middle meatus, and ethmoids will determine pathology in the larger sinuses. Blockage of the sinus ostia and dysfunctional mucociliary clearance mechanism causes mucus retention, which, if not cleared, invites secondary infection by bacterial flora resident in the nose and nasopharynx. Mechanical obstruction to airflow, for instance due to nasal polyps, deviated nasal septum or hypertrophied turbinates, increases the risk of infection. More than one sinus is frequently involved.

Acute frontal sinusitis is potentially serious because of the risk of orbital and intracranial **complications**. These include orbital cellulitis, meningitis, frontal bone osteomyelitis and extradural, subdural and frontal lobe abscesses.

Diagnostic criteria

***Clinical*:**

- Blocked nose, mucopurulent nasal discharge and pain and tenderness over the sinuses.
- Severe frontal headache may be present in acute frontal sinusitis.
- Intensification of symptoms along with fever suggests secondary bacterial infection.
- Failure to respond to adequate medical therapy suggests underlying chronic sinus disease.

***Investigations*:**

Diagnosis is usually clinical. However, good quality sinus X-rays help in confirmation. Occasionally CT-scans are required to delineate sinus pathology and prior to surgical drainage. Culture of pus released by antral puncture may be needed to guide antibiotic therapy.

Referral criteria

- Sinusitis not responding to medical therapy, for further investigations and antral puncture, antrostomy, frontal trephination or other relevant surgical procedures.
- Suspected orbital or intracranial complications.
- Discovery of predisposing pathology such as nasal polyposis or antral neoplasia.

Acute Sinusitis		
	Management	**Comments**
Non-drug treatment	Identify and treat the underlying cause, e.g. nasal allergy.	Referral for surgical intervention is required if symptoms do not respond to adequate medical therapy.
Drug treatment	Amoxicillin, oral, preferably after food < 20 kg, 10 mg/kg 8 hourly, for 7-10 days > 20 kg, 250–500 mg 8 hourly, for 7-10 days. PLUS Cloxacillin, oral, preferably before food 500 mg (ADULT) or 10 mg/kg (CHILD) 6 hourly for 7-10 days. OR Amoxicillin + Clavulanate (Co-amoxiclav), oral, 500 mg + 125 mg (ADULT) or 10 mg/kg in terms of amoxicillin base (CHILD) 8 hourly for 7-10 days. By IV injection, in terms of amoxicillin base, 1 g 8 hourly (ADULT) or 25 mg/kg (CHILD) 8 hourly – may be given 6 hourly in serious infections. OR Cefalexin, oral, 500 mg (ADULT) or 250 mg (CHILD 6 to 12 y) or 125 mg (CHILD 1 to 5 y) 8 hourly for 7-10 days. For infants 125 mg 12 hourly is the dose. All doses may be doubled in severe infection.	Antibiotic therapy should only be instituted in the presence of severe or persistent symptoms. Initiate antibiotic therapy empirically and reassess as soon as culture and sensitivity results become available or if there is no improvement within 48–72 hours. Intravenous antibiotics are indicated for sinusitis with orbital or intracranial complications and for severe sinusitis without complications. Cefadroxil is an alternative to Cefalexin. Dose is, oral, 500 mg (ADULT) or 250 mg (CHILD 6 to 12 y) or 125 mg (CHILD 1 to 5 y) 12 hourly. All doses may be doubled in severe infection. Cefuroxime is an alternative in penicillin allergic patients when parenteral therapy is required. Dose is 750 mg (ADULT) or 20 mg/kg (CHILD) IV every 6-8 hours. Parenteral metronidazole is not needed so long as the patient is able to take oral medication because oral bioavailability of metronidazole is nearly 100%.

Continued

Acute Sinusitis		
	Management	**Comments**
Drug treatment (Continued)	PLUS To give anaerobic coverage, to any of the above regimens add Metronidazole, oral, 10 mg/kg 8 hourly for 5-7 days.	
Nasal decongestant:	Oxymetazoline 0.05% (ADULT) or 0.025% (CHILD) nose drops, 2 drops in each nostril 8 hourly for a maximum of 5 days.	Use of decongestant nasal drops must not be prolonged to avoid the problem of rebound congestion.
Antipyretic/ analgesic/ anti-inflammatory:	Paracetamol, oral, 10 mg/kg 6 hourly. OR Ibuprofen, oral, 400 mg 6 to 8 hourly (ADULT) or 10 mg/kg 6 to 8 hourly (CHILD), preferably after food.	

Skin infections - Bacterial (Folliculitis, Skin abscesses, Impetigo, Echthyma, etc.)

Bacterial infections of the skin are encountered commonly in all age groups – particularly in children and diabetics. Minor infections may resolve with only local hygiene without the need for antibiotic therapy, or with topical antimicrobials. Systemic antibiotics are needed for more extensive involvement. In this section we will consider the common infections, excluding cellulitis (considered later), hidradenitis suppurativa and serious disorders that require hospitalization, like necrotizing skin infections and staphylococcal scalded skin syndrome.

Definition

Folliculitis, *skin abscesses*, and *carbuncles* are pus-filled pockets in the skin resulting from bacterial infection. They differ in the size and depth of the pus-filled pockets.

Impetigo is a skin infection, caused by *Staphylococcus aureus*, *Streptococcus pyogenes*, or both, that leads to the formation of scabby, yellow-crusted sores and, sometimes, small blisters filled with yellow fluid.

Erythrasma is infection of the superficial layers of the skin caused by the bacterium *Corynebacterium minutissimum*.

Pathogenesis and clinical features

Folliculitis is a superficial infection of a hair follicle. It looks like a tiny white pimple at the base of a hair. There may be only one infected follicle or many. Each infected follicle is slightly painful, but the person otherwise does not feel sick. Sometimes stiff hairs in the beard area curl and reenter the skin (ingrown hair) after shaving, producing irritation without substantial infection. This type of folliculitis is called *pseudofolliculitis barbae*.

Skin abscesses are warm, painful pus-filled pockets of infection below the skin surface. *Boils* or *furuncles* are deep seated infections around a hair follicle. A *pilonidal cyst* is an abscess that occurs in the crease of the buttocks after long trips that involve sitting. Skin abscesses may rapidly attain a large size. If not treated, they often come to a point and rupture. Bacteria may spread from the abscess to infect the surrounding tissue and lymph nodes. The person may have a fever and feel generally sick.

Carbuncles are clusters of small, shallow abscesses that connect with each other under the skin. Multiple areas may open and drain pus spontaneously. The person often has a fever and feels fatigued and sick. Carbuncles are more common in men and usually occur on the back of the neck. They often result in extensive peeling of skin and scar formation. Older people, people with diabetes, and people with serious medical disorders are more prone to carbuncles.

Most skin infections involving pus-filled pockets are caused by *Staphylococcus aureus* bacteria. Sometimes the bacteria enter the skin through a hair follicle, small scrape, or puncture, although often there is no obvious point of entry. People who have poor hygiene or chronic skin diseases or whose nasal passages contain staphylococci are more likely to have episodes of these skin infections. Some people may have recurring episodes of infection for unknown reasons.

Impetigo is common and affects mostly children. It can occur anywhere on the body but usually occurs on the face, arms, and legs. Small pustules develop initially with oozing of pus / serous discharge; later on crusts form. The blisters that may form (bullous impetigo) vary in size and can last for days to weeks. Impetigo often affects normal skin but may follow a break in the skin, such as caused by a fungal infection, vigorous scratching or insect bites.

Impetigo is itchy and slightly painful. The itching often leads to extensive scratching, particularly in children, which serves to spread the infection. Impetigo is very contagious – both to other areas of the person's own skin and to other people.

Infection with beta-hemolytic streptococci may produce deeper oozing and crusted sores than ordinary impetigo. This is sometimes called *ecthyma* and is seen mostly in unhygienic conditions in tropical and subtropical areas.

Erythrasma affects mostly adults, especially those with diabetes; it is most common in the tropics. Erythrasma often appears in areas where skin touches skin, such as under the breasts and in the armpits, webs of the toes, and genital area – especially in men, where the thighs touch the scrotum. The infection can produce irregularly shaped pink patches that may later turn into fine brown scales. In some people, the infection spreads to the torso and anal area.

Although erythrasma may be confused with a fungal infection, doctors can easily diagnose erythrasma because skin infected with *Corynebacterium* glows coral red under an ultraviolet light.

Systemic **complications** of the common skin disorders is uncommon if treatment is instituted early. Spreading infection can lead to cellulitis, lymphangitis, tender lymphadenopathy and septicemia. Streptococcal skin infections may lead to acute glomerulonephritis. Skin abscesses in the dangerous area of the face, if neglected, may lead to the dreaded complication of cavernous sinus thrombosis.

Referral criteria

- Carbuncles not responding to adequate treatment.
- Suspected systemic spread of infection.
- Suspected immunosuppressed state.

Bacterial Skin Infections		
	Management	**Comments**
Non-drug treatment	Heat treatment, usually with hot soaks or hot packs, is beneficial for boils and other abscesses. Heat reduces inflammation and discomfort and may speed up healing. A significant abscess requires incision and drainage of the pus. Sometimes the drained abscess is packed with antibiotic impregnated gauze, which is removed 24 to 48 hours later. If an abscess is completely drained it may not require systemic antibiotics. However, if the infection has spread or if the abscess is on the middle or upper part of the face, antibiotics are usually prescribed because of the risk that the infection might spread to the brain. In impetigo, the infected area should be washed gently with soap and water three to four times a day to remove crusts.	Advise good personal hygiene to avoid introducing a secondary infection. Impetigo is particularly contagious and the affected child should be kept away from other children till cured. If impetigo occurs on the scalp, exclude head lice, if located on the body, exclude scabies. Carbuncles are hard to eliminate because many small pus-filled pockets are difficult to find and drain. Any large abscesses are cut open to allow pus to drain. Antibiotics are needed and must sometimes be continued for a prolonged period.
Drug treatment	Topical treatment with Povidone iodine 5% ointment, applied locally two to three times daily. Amoxicillin, oral, preferably after food < 20 kg, 10 mg/kg 8 hourly, for 5-10 days > 20 kg, 250–500 mg 8 hourly, for 5-10 days. OR Erythromycin, oral, 500 mg (ADULT) or 10 mg/kg (CHILD) 6 hourly for 5-10 days.	In impetigo it is advisable to avoid topical antimicrobials if more than a few lesions are present. Topical mupirocin 2% applied two to three times daily is an alternative to Povidone iodine and can be effective against resistant staphylococci. However, it is expensive. Erythromycin is a good choice in penicillin allergic patients.

Continued

Standard treatment guidelines (continued)

Bacterial Skin Infections		
	Management	**Comments**
Drug treatment	Cefalexin, oral, 500 mg (ADULT) or 250 mg (CHILD 6 to 12 y) or 125 mg (CHILD 1 to 5 y) 8 hourly for 5-10 days. For infants 125 mg 12 hourly is the dose.	Cefadroxil is an alternative to Cefalexin. Dose is, oral, 500 mg (ADULT) or 250 mg (CHILD 6 to 12 y) or 125 mg (CHILD 1 to 5 y) 12 hourly.
Antipyretic/ analgesic/ anti-inflammatory:	Paracetamol, oral, 10 mg/kg 6 hourly. OR Ibuprofen, oral, 400 mg 6 to 8 hourly (ADULT) or 10 mg/ kg 6 to 8 hourly (CHILD), preferably after food.	

Skin infections – Fungal (Tinea, Candidiasis, Pityriasis, etc.)

Fungal infections of the skin are encountered commonly in all age groups. They may be caused by dermatophytes (morphologically multicellular filaments or hyphae) or yeasts (unicellular fungi that replicate by budding). The infection is usually confined to the superficial layers of the skin but deep dissemination may occur in immunocompromised subjects.

Definition

Tinea or *ringworm* is dermatophyte infection of the stratum corneum, hair or nails. Some thirty species of spore forming filamentous fungi, distributed among three genera – *Microsporum*, and *Trichophyton* and *Epidermophyton* – are responsible. The infection is given various names depending upon the site of involvement – *tinea capitis* (scalp and hair), *tinea corporis* (trunk and limbs), *tinea cruris* or *jock itch* (groins), *tinea manum* (hands), *tinea pedis* or *athlete's foot* (feet), and *tinea unguium* (nails).

Candidiasis or *thrush* is caused by the opportunistic pathogen *Candida albicans*. The infection may be superficial (cutaneous or mucosal), mucocutaneous or deep, the latter two forms usually associated with immunodeficiency. Apart from the skin, usually in intertriginous areas (*candidial intertrigo*) thrush may involve the oral and genital mucosae. Involvement of the nailfolds causes *candidial paronychia*.

Pityriasis versicolor or *tinea versicolor* is caused by chronic superficial overgrowth of the mycelial form of the commensal yeast *Pityrosporum orbiculare*. It involves the trunk and proximal portions of the arms.

Pathogenesis and clinical features

Dermatophyte fungi induce local cutaneous inflammation by metabolic effects and delayed hypersensitivity. Tropical climates and humid and sweaty environments predispose to infection. Males are more often affected. The erythematous scaling lesion enlarges slowly, with central clearing – this ring pattern is responsible for the popular name 'ringworm'. Zoonotic species of *Tinea* produce considerably more inflammation than anthropophilic species. Tinea cruris is commonly seen in athletes. Tinea manum typically appears as unilateral, diffuse, powder scaling of the hands rather than typical ringworm lesions. Itchy white interdigital maceration, usually of the 4th/5th toeweb space, is the commonest presentation of tinea pedis. Occlusive footwear and communal washing predispose to tinea pedis, apart from hot humid weather. Tinea unguium is rarely seen in children. Toenails, specially the big toenails, are more often involved than the fingernails. The process usually begins at the distal nail edge and extends proximally to involve the whole nail. The nail plate separates from the nail bed (onycholysis), becomes thickened crumbling and discolored, and subungal hyperkeratosis may occur. Tinea infections may be modified in appearance by inappropriate use of topical steroids, leading to delay in diagnosis – this condition is called *tinea incognito*.

Candida albicans is an ubiquitous commensal of the human mouth and gastrointestinal tract. It produces superficial infections in hot humid weather, when occupation involves great deal of wet work, personal hygiene is poor or when broad spectrum antibiotics have been used. Pregnancy, diabetes and immunodeficiency predispose to infection. Moist and opposing skinfolds (e.g. interdigital clefts, submammary, axillary and inguinal body folds) are common sites of involvement, presenting a moist, glazed and macerated appearance. White patches adherent to erythematous buccal mucosa is the common appearance of oral thrush. Poor oral hygiene, false teeth, inhaled corticosteroids, broad spectrum antibiotics, diabetes and immunosuppressed states predispose. Angular stomatitis may coexist. Genital thrush (vulvovaginal candidiasis in females and candidial balanitis in males) commonly appears as itchy sore vulvovaginitis in females. There may be a scanty creamy white offensive discharge. It can be spread through sexual contact. Chronic paronychia of the fingernails is often seen in wet workers. The cuticle is lost, the proximal nailfold becomes swollen and boggy and pressure may extrude a scanty pus-like discharge. The nailplate also becomes irregular and discolored.

Pityriasis affects young adults more often. In tanned or racially pigmented skin it appears as hypopigmented macules and patches; on white skin the lesions are erythematous. Fine scaling occurs and the lesions are seldom significantly itchy. Differentiation from vitiligo is essential.

Complications of the fungal skin infections are uncommon. Scratching of tinea lesions may invite secondary bacterial infections. Alopecia can occur as a sequel to tinea capitis. Acute bacterial paronychia may supervene or chronic candidial paronychia. Staphylococci are usually involved. Persistent or spreading candidiasis should raise the suspicion of immunocompromised state.

Diagnostic criteria

***Clinical*:** Already mentioned.

***Investigations*:**

- Dermatophyte infections may be confirmed, in case of doubt, by microscopy of skin scrapings treated with 10% potassium hydroxide solution.
- Dermatophyte species can be confirmed by culturing on a suitable medium like Sabouraud's agar, but this requires weeks and is seldom necessary.
- Wood's ultraviolet light examination is positive in tinea capitis.

Referral criteria

- No response to appropriate treatment.
- Suspected systemic spread of *Candida* infection.
- Suspected immunosuppressed state.

Fungal Skin Infections		
	Management	**Comments**
Non-drug treatment	Personal hygiene is important. Affected areas must be cleaned and dried carefully and kept dry by using dusting powder if necessary. Oral hygiene is important to prevent recurrences of oral thrush. Similarly for genital thrush. Reducing extent of wetwork is helpful in candidial paronychia.	Occlusive footwear and communal bathing should be avoided in case of tinea pedis. Synthetic socks may need to be given up. Systemic antibiotics may need to be stopped in *Candida* infections.
Drug treatment Topical antifungal therapy:	Topical Clotrimazole 1%, applied locally twice daily, for 2 weeks after resolution of lesions (minimum 3 weeks) OR Topical Miconazole 2%, applied locally twice daily, for 2 weeks after resolution of lesions (minimum 3 weeks).	For oral thrush, Clotrimazole 1%, mouth paint may be applied locally thrice daily. For vaginal candidiasis, antifungals can be used locally as pessaries, but oral fluconazole (see below) is simpler and more convenient.
Systemic antifungal therapy:	Griseofulvin, oral, 10 mg/kg daily (ADULT 500 mg), preferably in micronized form after food. Duration of treatment should be 1-2 months for tinea corporis and tinea manum, 3 months for tinea capitis, 4-8 months for fingernail infection and 18 months for toenail involvement. OR	Systemic therapy is often needed for tinea capitis, tinea manum, tinea unguium and extensive tinea corporis and pityriasis versicolor. Candidial intertrigo may also respond well to initial short course of an oral antifungal.

Continued

Fungal Skin Infections		
	Management	**Comments**
Systemic antifungal therapy:	Fluconazole, oral, 50 mg daily (ADULT) or 3-6 mg/kg on first day then 3 mg/kg daily (CHILD), preferably after food. Duration of treatment is 1-2 weeks for oropharyngeal candidiasis, 2 weeks for candidial paronychia, and 2-4 weeks for candidial intertrigo, pityriasis versicolor and extensive ringworm. Tinea pedis may require 6 weeks. Vulvovaginal candidiasis and candidial balanitis responds well to a single 150 mg dose, that may be repeated once after a week.	Response to griseofulvin in tinea unguium is restricted to about 70% in fingernail infection and 30% in toenail infection. Terbinafine daily therapy (oral, 250 mg daily in ADULT for 6-12 weeks) and itraconazole pulse therapy (oral, 200 mg twice daily in ADULT – 7 days monthly, 2 pulses for fingernail and 3 pulses for toenail infection) are alternatives to long-term griseofulvin therapy for tinea unguium. However, these are costly.

Tuberculosis, pulmonary

Tuberculosis is a serious and growing health problem in India, expanded and complicated by HIV/AIDS and multiple drug resistant disease. A revised national tuberculosis control program (RNTCP) is currently operational throughout India, based on the premise that the first priority and most important aspect of TB control is to cure infectious (smear-positive) patients. The major tenets of this program are:

- supported and implemented by a hierarchical infrastructure, that includes adequate laboratory facilities.
- there are standard case definitions
- smear positive cases are identified quickly through sputum smear microscopy
- patients are supported and encouraged through directly observed treatment to complete their treatment.
- compliance, treatment response and outcomes are measured and reported
- drug supply is assured

The Indian RNTCP guidelines have been followed in the standard treatment protocols presented here:

The use of tobacco and alcohol should be strongly discouraged during treatment.

If the patient is underweight or has an alcohol problem, pyridoxine should be given routinely to TB patients. The dose is 25 mg in the mornings that TB drugs are taken.

Definition

A chronic, granulomatous infection of the lungs caused by *Mycobacterium tuberculosis*. Although lungs and lymph nodes are most commonly involved, tuberculosis can affect practically any organ system of the body.

Pathogenesis

Pulmonary tuberculosis (PTB) is always a serious disease, especially in the very young, the malnourished, and the immunodeficient. There is a strong association between PTB and HIV infection. The route of contagion is through inhalation. In endemic regions, many individuals develop the primary TB infection at a young age. However, the majority will be asymptomatic and recover without any sequelae.

A significant percentage, however, will proceed to develop the **complications** of the primary infection. These complications include pressure effects due to enlarged hilar and mediastinal lymph glands (e.g. tracheal/bronchial stenosis or obstruction with secondary atelectasis), spread of infection causing a TB bronchopneumonia, pleural effusion, miliary tuberculosis, meningitis and metastatic extrapulmonary involvement at almost any site.

In adults, PTB generally occurs due to reactivation of a latent primary infection. Malnutrition and immunodeficiency are risk factors for reactivation. Cavitation of the lungs, fibrosis, pleural effusion frequently occur. Recurrent hemoptysis is another problem. Cavitary pulmonary TB, where the patient is expectorating frequently, is highly contagious.

Diagnostic criteria

Clinical **:**

- Cough for over 4 weeks, often productive. There may be recurrent hemoptysis.
- Low grade fever.
- Weight loss.
- Non-specific symptoms like weakness, lassitude, anorexia, are common.
- Dyspnea may occur if there is extensive chest involvement.
- In children, persistent cough, anorexia and failure to thrive may be the only symptoms.

Investigations**:**

Diagnosis can be clinical, but requires confirmation through:

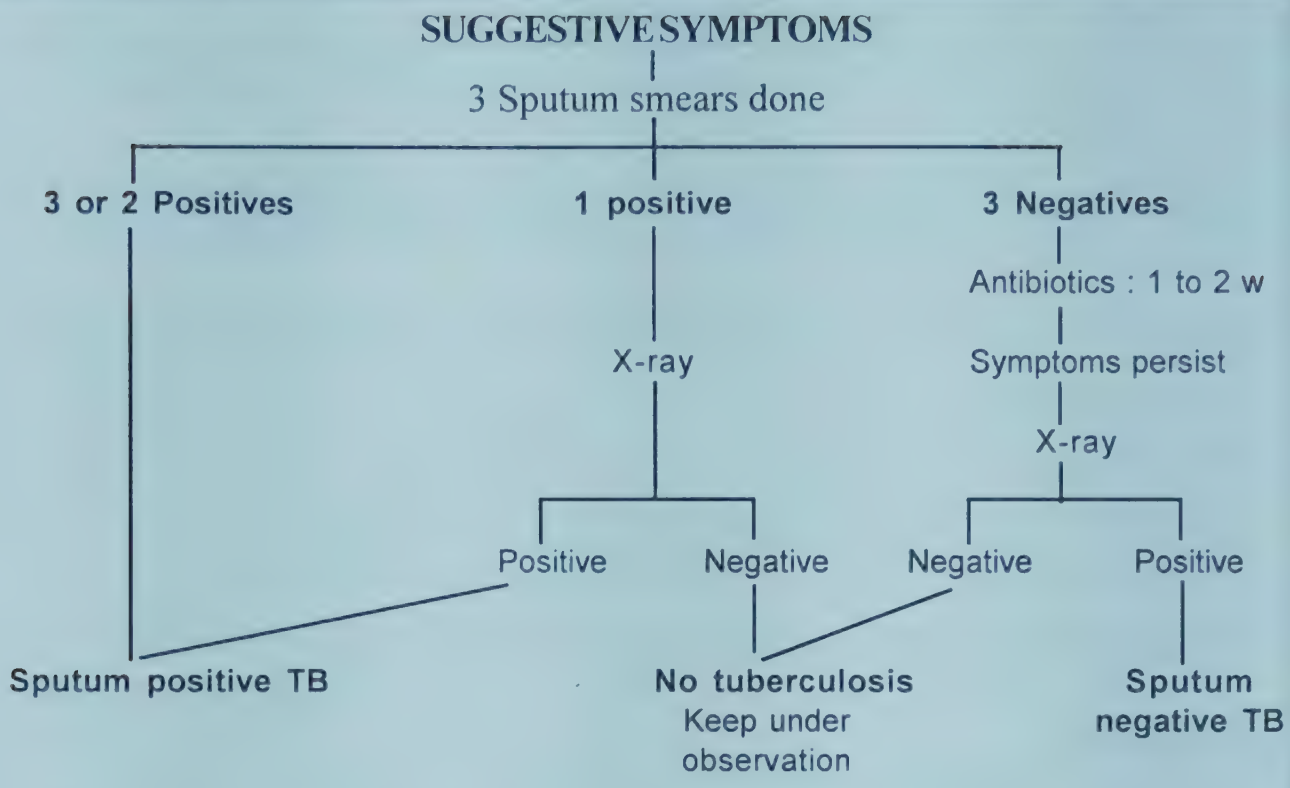
- Sputum smear examination (3 successive smears over 2 or 3 days) for acid-fast bacilli. This is the cornerstone of diagnosis under the RNTCP. This is also used for treatment follow-up.
- Chest X-ray. Suggestive findings does not indicate currently active disease.
- Tuberculin test by the Mantoux technique (not used under the RNTCP). A positive Mantoux test means that the person has been in contact with TB bacilli, but does not necessarily mean that he has active disease. The Mantoux test is regarded as positive if the induration is 15 mm or more in a child who has been immunized with BCG vaccine, and 10 mm or more in a child who has not previously received BCG. The test may be falsely negative in the presence of malnutrition, immunodeficiency (e.g. AIDS), immunosuppression (e.g. steroid therapy, cancer chemotherapy) or overwhelming TB disease; and also following viral infection (e.g. measles) or viral vaccination.

Diagnostic algorithm, case categorization, treatment and follow-up algorithms under the RNTCP are given below:

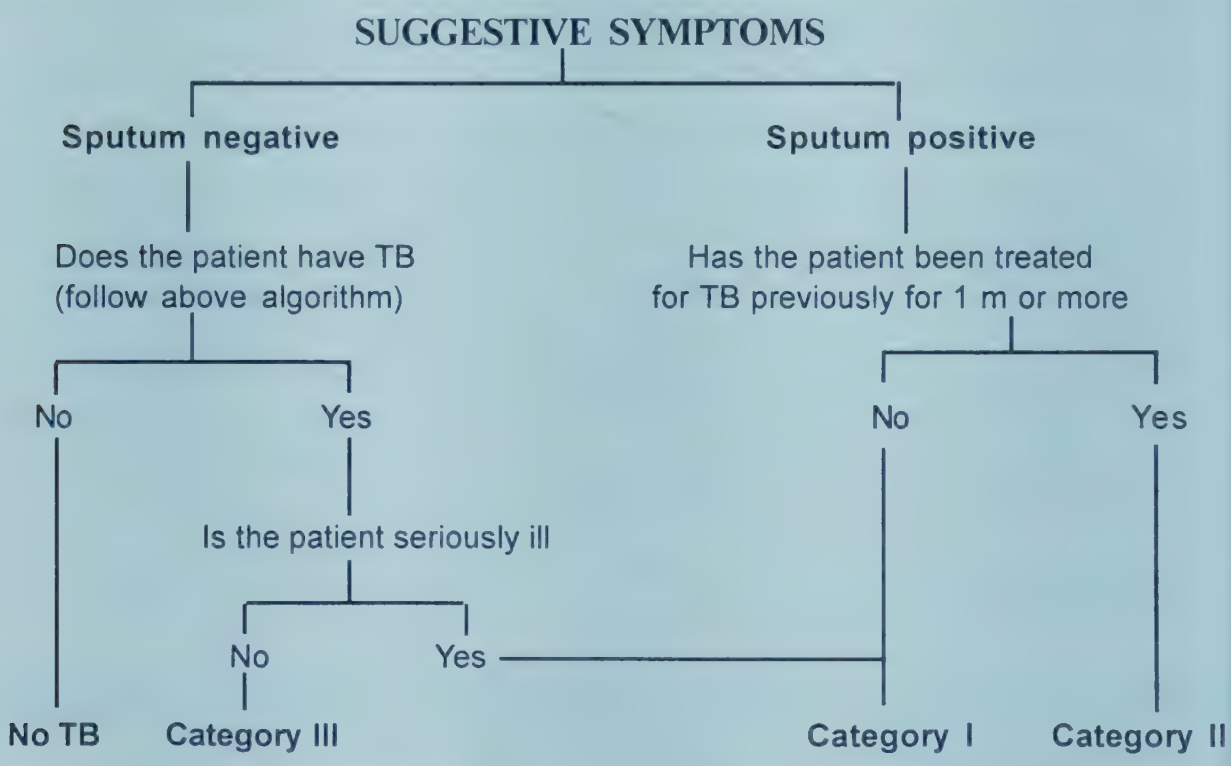
Referral criteria

- Treatment failure / Chronic cases.
- History of close contact with multidrug resistant (i.e. resistance to at least isoniazid and rifampicin) TB.
- Presence / suspicion of co-existent HIV function.

Diagnostic algorithm:

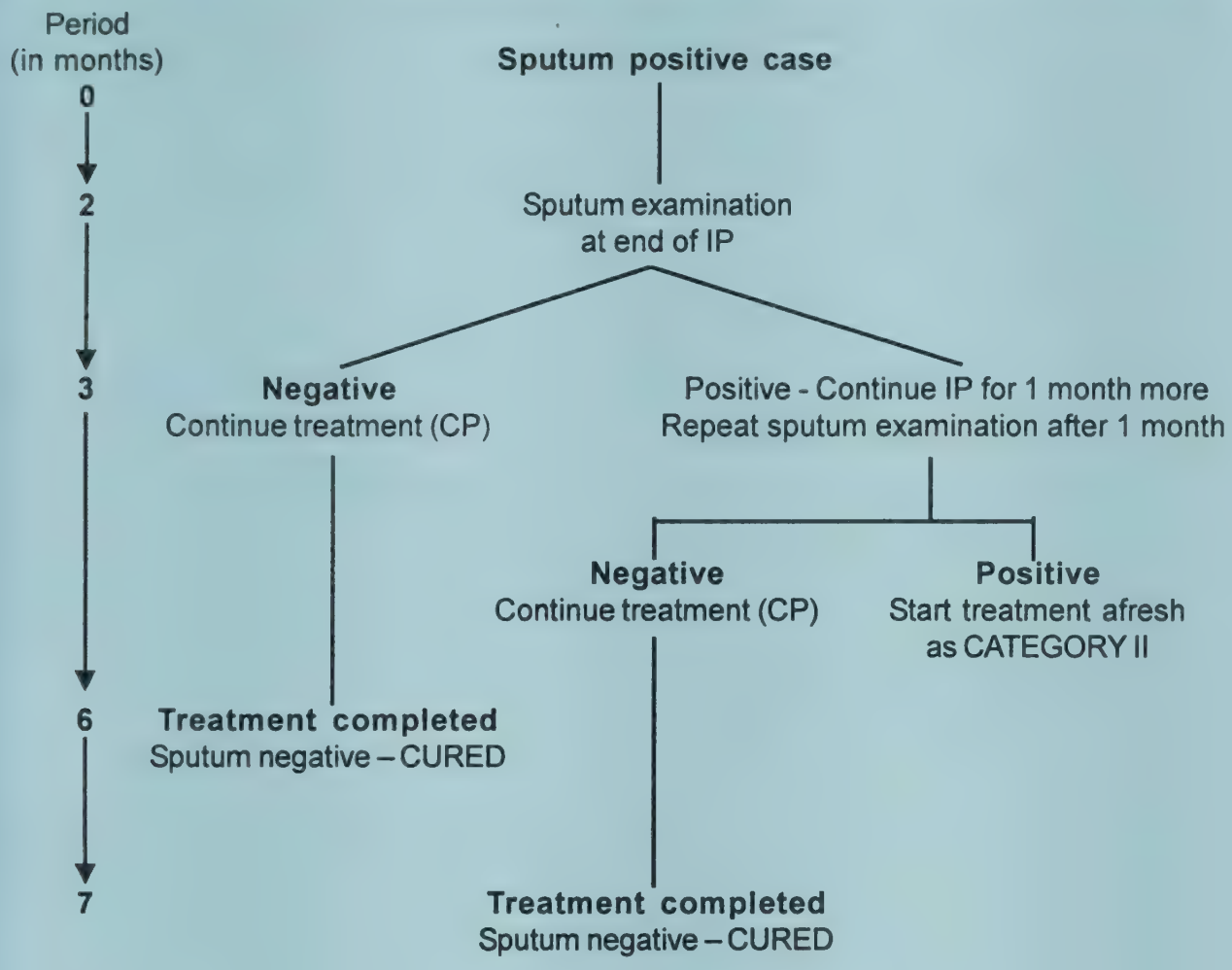


Patient categorization:



N.B. Patients with extrapulmonary TB are considered as Category III, unless they are seriously ill.

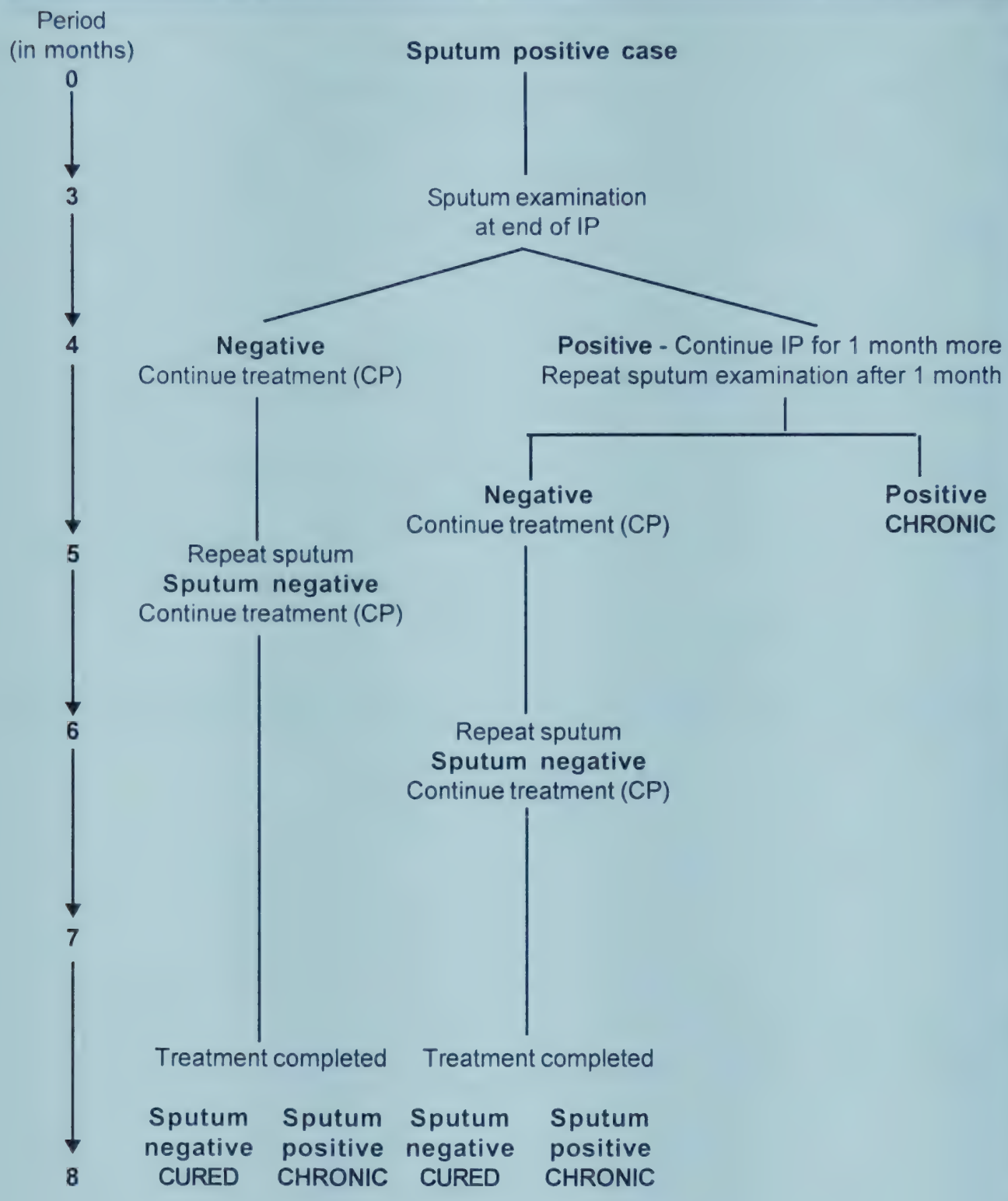
Treatment and follow-up algorithm for sputum smear positive CATEGORY I cases



IP = Intensive Phase of treatment

CP = Continuation Phase of treatment

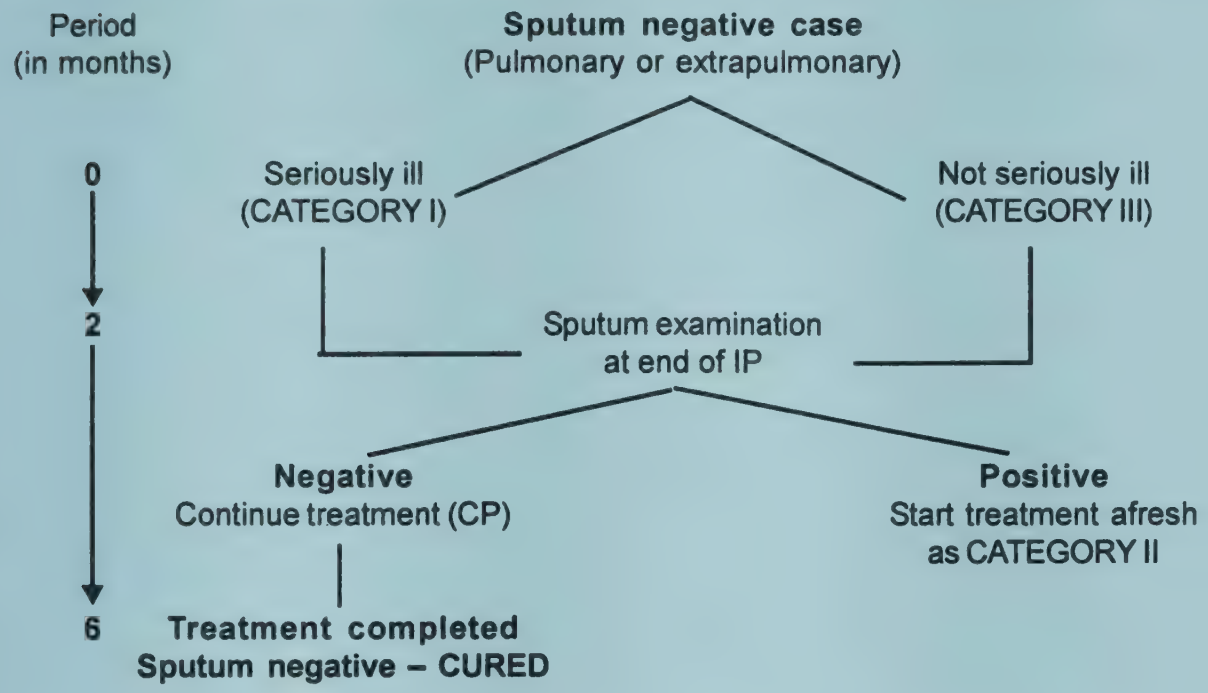
Treatment and follow-up algorithm for sputum smear positive CATEGORY II cases



IP = Intensive Phase of treatment

CP = Continuation Phase of treatment

Treatment and follow-up algorithm for sputum smear negative cases



IP = Intensive Phase of treatment

CP = Continuation Phase of treatment

Tuberculosis, pulmonary		
	Management	**Comments**
Non-drug treatment	Nutritional status must be properly maintained. Oxygen inhalation may be needed for severely ill patients. Large, symptomatic pleural effusions may require chest tube drainage.	Advise on cough hygiene (e.g. mouth covered with napkin while coughing, not spitting randomly in open places), the importance of treatment adherence and education of caregivers are important components of TB management. Family members or close contacts with symptoms need diagnostic work-up.
Drug treatment	Directly observed treatment - Short course chemotherapy (DOTS) is the recommended strategy for antimicrobial treatment under RNTCP. Thrice a week dosing, given under direct observation, as advocated by RNTCP should be followed. Doses must be adjusted according to body weight. Unsupervised daily treatment should be offered only to patients who are responsible enough, and whose family circumstances permit full compliance with the regimen. The triweekly regimens are as follows. The daily regimens are similar, except that the doses vary and are given daily. The prefix number indicates the number of months, the subscript number denotes the number of treatment days per week. Note abbreviations: PTB = pulmonary tuberculosis, IP = intensive phase regimen, CP = continuation phase regimen, H = isoniazid, R = rifampicin, Z = pyrazinamide, E = ethambutol, S = streptomycin, +ve = positive, –ve = negative	Patients and family members need to be alerted regarding the adverse reactions of antitubercular drugs. Liver function tests needed if symptoms like anorexia, nausea, vomiting, develop. Other points to note: • Ethambutol is not recommended in very young children as they may not be able to report visual symptoms when they occur. • For children weighing less than 11 kg (infants), treatment should be undertaken by an experienced pediatrician. • Category II patients are at risk of developing multidrug-resistant TB and therefore should receive fully supervised intensive treatment for at least first 3 months. If reliable laboratory facilities are available, a pretreatment sputum sample should be collected for culture and drug susceptibility testing. Patients who remain sputum-positive at the end of 3 months should continue to receive supervised therapy till sputum

Continued

Tuberculosis, pulmonary

Management

Drug treatment (Continued)

Category	Type of patient	IP	CP
I	New smear +ve PTB Seriously ill smear –ve PTB Seriously ill extrapulmonary TB	$2H_3R_3Z_3E_3$	$4H_3R_3$
II	Smear +ve relapse Smear +ve treatment failure Smear +ve treatment after default	$2H_3R_3Z_3E_3S_3$ / $1H_3R_3Z_3E_3$	$5H_3R_3$
III	Smear –ve PTB not seriously ill Smear –ve extrapulmonary TB not seriously ill	$2H_3R_3Z_3$	$4H_3R_3$

Seriously ill smear negative PTB includes all forms of PTB other than the primary complex (in children). Seriously ill extrapulmonary TB includes disseminated forms of TB (miliary TB), TB meningitis, TB pericarditis, intestinal TB and TB peritonitis, bilateral or extensive pleurisy, spinal TB with or without neurological complications, other forms of osteoarticular TB and TB of the genitourinary tract. Non-serious forms of extrapulmonary TB include lymph node TB and unilateral pleural effusion.

Individual drug dosages are given in the next table.

Comments

conversion is documented or till they are categorized as chronic cases. Smear-negative relapsed or treatment failure patients are to be managed by similar regimes.

- Daily dose of streptomycin should not exceed 0.75 g for patients over 50 y age. Streptomycin is restricted to the first 2 months of the initial intensive phase in Category II.
- In Category III, priority is higher for smear-negative pulmonary TB patients (a proportion of them will become smear-positive in time) than for patients with benign forms of extrapulmonary TB.
- Patients declared as chronic cases are likely to be suffering from multidrug-resistant TB and management is highly problematic. They should be referred. Even with optimal retreatment no more than 50% will be cured. If reliable laboratory facilities are available drug susceptibility should be determined and treatment commenced with second-line or experimental drugs. Second line drugs are more expensive and toxic and treatment should therefore be supervised in hospital. If resources are limited, they should not be diverted to chronic cases - such patients may be put on indefinite isoniazid treatment to keep the disease as much suppressed as possible and to reduce infectivity.

Drug doses for the treatment of tuberculosis in children (less than 12 years) and adults

Drug	Dose in mg / kg (maximum dosage in parentheses)					
	Daily regimens		Twice weekly regimens		Thrice weekly regimens	
	Child	Adult	Child	Adult	Child	Adult
Isoniazid (INH)	10-20 (300 mg)	5 (300 mg)	20-40 (900 mg)	15 (900 mg)	20-40 (900 mg)	10 (900 mg)
Rifampin (RIF)	10-20 (600 mg)	10 (600 mg)	10-20 (600 mg)	10 (600 mg)	10-20 (600 mg)	10 (600 mg)
Pyrazinamide (PZA)	15-30 (2 g)	15-30 (2 g)	40-60 (4 g)	40-60 (4 g)	30-40 (3 g)	30-40 (3 g)
Ethambutol (EMB)	15-25	15-25	50	50	25-30	25-30
Streptomycin (SM)	20-40 (1 g)	15 (1 g)	25-30 (1.5 g)	25-30 (1.5 g)	25-30 (1.5 g)	25-30 (1.5 g)

- Doses based on weight must be adjusted as the patient's weight changes.
- Twice weekly regimens are not recommended under revised national tuberculosis program of India.
- All patients prescribed an intermittent regimen should be given directly observed therapy.
- Pyrazinamide and streptomycin should not be used to treat pregnant women. There is not enough information about how PZA affects the fetus. SM has been shown to have harmful effects on the fetus.
- Ethambutol is not recommended for children who are too young to be monitored for changes in their vision. However, it should be considered for all children who have TB that is resistant to other drugs but susceptible to EMB.

Typhoid and Paratyphoid fevers (Enteric fever / Salmonellosis)

Definition

Typhoid fever is a systemic, infectious disease caused by *Salmonella typhi*. The milder paratyphoid fevers are caused by *S. paratyphi* serotypes A and B.

Pathogenesis

Salmonellae are transmitted by the feco-oral route through contamination of food and water. The organisms enter the body through the gut and multiply mainly in the submucosal lymphoid tissue (Peyer's patches) of the small intestine. These swell at first, then ulcerate and ultimately heal. However, during this sequence they may bleed or perforate. After an incubation period of 1–3 weeks, the organisms enter the bloodstream causing a transient bacteremia. They multiply in the reticuloendothelial cells of the liver and spleen, resulting in a persistent bacteremia, with dissemination to multiple organs, and an endotoxemia. Organisms are excreted into the bile causing reinfection of the small intestine.

Complications include gastrointestinal hemorrhage, bowel perforation, pneumonia, meningitis, cholecystitis, myocarditis, septic arthritis, osteomyelitis, myocarditis, hepatitis, nephritis and chronic carrier state.

Diagnostic criteria

***Clinical*:**

- Fever (stepladder pattern of rise of temperature), headache, anorexia, vomiting, diarrhea or constipation, ileus, abdominal pain or tenderness, epistaxis, cough, erythematous macular or maculopapular rash on trunk, at the end of the first week, that fades with pressure (Rose spots).
- Relative bradycardia.
- Hepatomegaly and/or splenomegaly.
- Meningism, delirium, stupor.

Paratyphoid fever runs a milder and shorter course than typhoid fever. The onset is however often more abrupt with acute enteritis. Intestinal complications are uncommon.

***Investigations*:**

- Leucopenia, anemia, thrombocytopenia.
- Positive cultures from blood (1st week), stools (after 1st week), urine and bone marrow. Positive Widal test – requires cautious interpretation and a knowledge of prevailing titers.

Referral criteria

- Typhoid with complications.
- Typhoid not responding to adequate therapy.

Typhoid and paratyphoid fevers (Enteric fever / Salmonellosis)		
	Management	**Comments**
Non-drug treatment	Correction and maintenance of fluid and electrolyte status. Provision of a nutritious diet. Blood transfusion if severely anemic (10–20 mL/kg).	Good supportive care is important. Isolate patient until 3 consecutive stools are culture negative.
Preventive measures:	Education on personal hygiene, hand washing, food preparation practices and contamination of water. Typhoid vaccination is not recommended routinely in endemic areas, but could be considered if opportunities permit.	Typhoid vaccination is recommended for travelers from non-endemic to endemic areas.
Drug treatment	Chloramphenicol, IV / PO, 50–100 mg/kg per day in 4 divided doses (6 hourly) for 14 days. OR Ofloxacin, PO, ADULT 400 mg twice daily for 14 days. OR Ceftriaxone, IM or IV, 2 - 4 g once daily (ADULT) or 50–80 mg/kg once daily (CHILD) for 5–7 days.	Relapse and carrier state may occur despite adequate therapy. Change chloramphenicol dosing from IV to oral when the patient's condition has improved. It may also be possible to reduce daily dose to 2 g per day (ADULT) or 30 mg/kg (CHILD) in divided doses. Other fluoroquinolones may also be effective. However, quinolones should be avoided in children because of concerns over arthropathy and cartilage damage. A 4-week course of a fluoroquinolone to which the organism is sensitive is currently the best option for eliminating the chronic carrier state, specially in the presence of gallstones. In case of complications like shock, stupor and coma, or when surgical intervention is anticipated, referral to a hospital is needed.
Central nervous system complications:	Dexamethasone, IV, initially 3 mg/kg, followed by 1 mg/kg 6 hourly for 48 hours.	
Surgical treatment	Surgical intervention for bowel perforation.	

Urticaria

Definition

Eruptive dermal edema characterized by transient, itchy wheals. May show acute or chronic recurrent course.

Pathogenesis

Urticaria may be mediated through immune (allergic) or non-immune mechanisms. Lesions result from release of various mediators from mast cells, particularly histamine, which increases local vascularity and vascular permeability.

Majority fall in acute (e.g. drug induced, food allergy) and chronic idiopathic categories. Another substantial proportion are due to dermographism (exaggerated wheal and flare response to stroking of the skin), cold, heat, sun exposure, pressure and other physical factors. Acute contact urticaria may be a component of contact dermatitis. Insect bites, pregnancy, worm infestations, systemic lupus erythematosus, lymphomas, and various other less common associations have been noted.

Urticarial vasculitis often has an acute onset with widespread lesions that persist for more than 24 hours and fade leaving purpura. Underlying systemic abnormalities may be present. *Angioedema* signifies a larger area of affliction with involvement of the dermis, subcutaneous and submucosal tissues. Acute angioedema may be life-threatening if the laryngeal mucosa is involved.

Diagnostic criteria

***Clinical*:**

- Red, itchy or intensely itchy wheals in the affected area.
- Association with a triggering factor may be obvious e.g. drugs, skin stroking, pressure, etc.
- In chronic urticaria, the wheals manifest as recurrent papules or plaques that vary in location, size, shape and duration. Association with drugs may be noted but usually there is no discernable cause. Spontaneous resolution in a few months is to be expected, but a minority are troubled for years.
- Angioedema is usually signified by swelling of the lips and face. This needs to be distinguished from facial contact dermatitis.
- Serious cutaneous drug reactions, like Stevens-Johnson syndrome and toxic epidermal necrolysis may start of as urticaria but will persist beyond 48 hours.

***Investigations*:**

- Diagnosis is clinical, but in recurrent cases, full blood count, liver function tests, serum antinuclear factor and urine analysis are advised to exclude underlying systemic conditions.

Referral criteria

- Chronic idiopathic urticaria refractory to oral antihistamine therapy.
- Urticarial vasculitis or suspicion of serious underlying disorders.
- Recurrent angioedema or suspicion of hereditary angioedema.

Urticaria		
	Management	**Comments**
Non-drug treatment	Avoid exposure to trigger or precipitating factors where applicable.	Advice to cut children's fingernails short to stop them from injuring the skin by scratching; with babies it may be necessary to cover their hands in the acute phase with gloves or socks. Dietary factors may be aggravating chronic idiopathic urticaria even if not primarily responsible. Exclusion of possible triggers (such as preserved foods) may help.
Drug treatment	Promethazine, deep IM injection (severe case), ADULT 25-50 mg (maximum 100 mg); CHILD 5-10 years 6.25-12.5 mg (maximum 25 mg). OR Promethazine, oral, ADULT 25 mg, increased to 25 mg twice daily if needed. CHILD under 2 years not recommended; CHILD 2-5 years 5-15 mg daily in divided doses; CHILD above 5 years 10-25 mg daily in divided doses. OR Cetirizine, oral, ADULT 10 mg once daily; CHILD under 2 years not recommended; CHILD 2-5 years 5 mg once daily or 2.5 mg twice daily; CHILD above 5 years 10 mg once daily or 5 mg twice daily.	Promethazine by slow IV injection (as a solution containing 2.5 mg/mL in water for injection) is used as an adjunct to adrenaline in the emergency management of anaphylaxis and acute angioedema. IV use is not required in urticaria. Prednisolone 0.5 mg/kg, oral, can be used in severe cases of acute urticaria or angioedema for short durations (few days). It is not recommended in chronic urticaria. Deworming may help in recurrent acute urticaria in children.

Urinary tract infection (Acute cystitis, Acute pyelonephritis, etc.)

Definition

Culture-proven presence of pathogenic micro-organisms in significant concentration in the urine.

Cystitis is involvement of the urinary bladder. Pyelonephritis refers to acute or chronic infection/inflammation of the renal parenchyma and pelvis, frequently associated with obstruction/stasis of urine flow and/or reflux of urine into the ureters and renal pelvis.

Pathogenesis

Migration of organisms from the perineum to the urinary tract via the urethra. Hematogenous spread via the kidneys also occurs, especially in babies under 6 months of age.

Predisposing factors include female sex, anatomical and functional abnormalities of the urinary tract. *Escherichia coli* is the usual pathogen in an anatomically normal urinary tract.

Upper urinary tract infection is facilitated by vesicoureteral reflux and various factors decreasing host resistance. Obstruction to urine flow is also a major contributory and aggravating factor. In 90% of cases of chronic pyelonephritis, vesicoureteral reflux is present. Pyelonephritis may be unilateral or bilateral.

Complications of lower urinary tract infection include involvement of the upper urinary tract with generalized symptoms and signs of infection (pyelonephritis, and possibly, renal abscess or septicemia) and renal function impairment, specially on repeated infection. Pyelonephritis may be complicated by renal damage with impairment of renal function, hypertension, perinephric abscess, and renal failure.

Diagnostic criteria

Clinical:

- May be asymptomatic.
- Neonates may present with fever, hypothermia, poor feeding, jaundice, failure to thrive, strong-smelling urine, sepsis, renal failure, vomiting.
- Infants, children and adults present with strong-smelling urine, fever, chills, abdominal pain, frequency, dysuria, enuresis, urgency.
- Renal involvement is suggested by intensification of the fever, pain and/or tenderness in one or both loins, renal angle or lumbar region radiating to the iliac fossae and suprapubic area.

***Investigations*:**

The following concentrations of an organism in the urine are regarded as significant, depending on the method of collection:

- Mid-stream clean-catch specimen: > 100 000 colonies/mL urine.
- Catheter specimen: > 1 000 colonies/mL urine.
- Supra-pubic aspirate: any number of colonies.
- Raised total leukocyte and differential neutrophil counts.
- Vesicoureteral reflux on voiding cystourethrography. This examination should be done 4–6 weeks after the clearance of infection to avoid iatrogenic proximal spread of organisms and false positive findings. If obstructive uropathy is suspected, investigate as soon as the urine is sterile.

Referral criteria

- Complicated urinary tract infection.
- Recurrent infection in children, particularly less than 2 years of age.
- Recurrent infection in women, especially outside pregnancy.
- All men with confirmed infection: for the exclusion of prostatomegaly and other obstructive pathologies.
- Pyelonephritis with underlying obstruction to urine flow and/or vesicoureteral reflux.

Urinary Tract Infection		
	Management	**Comments**
Non-drug treatment	Ensure adequate intake of fluids to irrigate the bladder and to dilute high bacterial concentrations. Catheterized patients who develop symptomatic UTI may require catheter removal to clear the infection. Antibiotics cannot clear infection in the presence of foreign material but can reduce the danger of invasive infection.	Perineal hygiene. Regular complete emptying of the bladder and/or double voiding (i.e. making an additional attempt at voiding after the initial flow of urine has ceased.) Avoid irritant underwear. Search for underlying anatomical and/or functional abnormalities in all proven infections in men and recurrent infection in children (particularly less than 2 years age) and women (specially outside pregnancy). Renal ultrasound and/or excretory urogram and voiding cystourethrogram may be advised.
Drug treatment Antipyretics:	Paracetamol, oral, 10 mg/kg 4–6 hourly.	Non-steroidal anti-inflammatory drugs should be avoided since they can reduce already compromised glomerular perfusion and cause acute renal failure.
Antibiotics: Neonates and infants < 3 months:	Gentamicin, IM or slow IV, 2 mg/kg 8 hourly (3 mg/kg 12 hourly if < 2 weeks) PLUS Cefotaxime, slow IV, 50–150 mg/kg daily in 2–3 divided doses.	In recurrent UTI, in particular, antibiotic therapy should be guided by culture and sensitivity tests on clean catch midstream urine samples. Start empirical antibiotic therapy and reassess when test results become available. The appropriate antibiotic should be prescribed for a minimum of 7–14 days to prevent recurrence. Co-trimoxazole is contraindicated in pregnancy. In pregnancy, urine culture should be repeated 1 week after completion of antibiotic course to ensure that the infection has cleared. In children, asymptomatic bacteriuria may have the same adverse long-term prognosis as symptomatic infection and
Older children:	Trimethoprim/sulfamethoxazole combination (Co-trimoxazole), PO, 6 weeks–5 months, 20 / 100 mg twice daily for 7–14 days,	

Continued

Standard treatment guidelines (continued)

Urinary Tract Infection		
	Management	**Comments**
Older children: (Continued)	6 months–5 years, 40 / 200 mg twice daily for 7–14 days, 6–12 years, 80 / 400 mg twice daily for 7–14 days. OR Cefixime, PO, 4 mg/kg twice daily for 7–14 days. OR Gentamicin, IM or slow IV, 1.5 to 2 mg/kg mg thrice daily for 7 days. OR Cefotaxime, IM or slow IV, 100–150 mg/kg daily in 2–3 divided doses for 7–14 days.	therefore should be treated in the same way. In adults, treatment of asymptomatic bacteriuria is not needed except in pregnant women and in individuals with obstructive structural abnormalities (definite risk of acute pyelonephritis without treatment). Patients with acute pyelonephritis who are severely ill may do better with initial parenteral therapy. Pyelonephritis needs to be treated for minimum 10 days. Longer treatment may be necessary for complicated pyelonephritis. Prophylaxis is required when recurrent infections or relapses occur, and where there is structural and/or functional abnormality of the urinary tract, which cannot be corrected. Nitrofurantoin 50 mg at night after food may be used in ADULT. Urine cultures should be repeated at least every 3 months while on prophylaxis and every 3 months for a year after cessation of treatment.
Adults	Trimethoprim/sulfamethoxazole combination (Co-trimoxazole), PO, 160 / 800 mg twice daily for 7–14 days. OR Norfloxacin, PO, 400 mg twice daily for 7–14 days. OR Cefixime, PO, 200-400 mg twice daily for 7–14 days. OR Gentamicin, IM or slow IV, 1.5 to 2 mg/kg mg thrice daily for 7 days. OR Co-amoxiclav, slow IV, 1.2 g thrice daily for 7–14 days. OR Cefotaxime, IM or slow IV, 1–2 g twice daily for 7–14 days.	

Varicella (Chicken pox)

Definition

Acute, contagious, viral disease caused by varicella-zoster virus.

Pathogenesis

Primary infection is caused by the varicella-zoster virus which is highly contagious and spreads by infective droplets or fluid from vesicles. Incubation period is 2 to 3 weeks. Varicella is contagious from about 5 days before the onset of the rash until the crusts begin to disappear. One attack confers lifelong immunity. However, reactivation of the persisting dormant virus may appear later in life as herpes zoster (shingles) affecting cutaneous nerves.

Complications include secondary skin infections, hemorrhagic varicella lesions with evidence of disseminated intravascular coagulation, pneumonia and encephalitis. Complications are more common in immunocompromised patients.

Diagnostic criteria

***Clinical*:**

- Mild headache, fever and malaise.
- Characteristic rash. The lesions progress from macules to vesicles in 24–48 hours; successive crops appear every few days. The vesicles, each on an erythematous base, are superficial, tense 'teardrops' filled with clear fluid; they dry to form fine crusts. The rash is more profuse on the trunk and sparse at the periphery of extremities. At the height of eruption, all stages (macules, vesicles and crusts) are present at the same time – hence 'pleomorphic' rash. The rash lasts 8–10 days and heals without scarring, unless secondarily infected.
- Mucous membranes may be involved.
- Pruritus may be severe.

***Investigations*:**

- Scrapings of base of vesicles may show characteristic giant cells with viral inclusions. However, this is seldom necessary.

Referral criteria

- Varicella with complications, e.g. encephalitis, pneumonia, extensive secondary skin infections.
- Varicella in immunocompromised patients.
- Neonates born to mothers who contracted varicella 5 days before to 2 days after delivery.

Varicella (Chicken pox)		
	Management	**Comments**
Non-drug treatment	Maintain adequate hydration and nutrition.	Isolate the patient as varicella is highly contagious, particularly to non-immunized children. Isolate the neonate until the mother is regarded as non-contagious.
Drug treatment Antiviral treatment:	Aciclovir, IV, 5–10 mg/kg (250–500 mg/m2) 8 hourly for 7–10 days, each dose administered over 1 hour OR Aciclovir, oral, 20 mg/kg (maximum 800 mg/dose) 5 times daily for 5 days, initiated within 24 hours of the appearance of the rash.	Specific antiviral treatment is generally not needed. However, Consider antiviral therapy for: • varicella with complications in immunocompetent patients. • varicella in immunocom-promised patients. • exposure of immunocom-promised patients to varicella. • exposure of neonates to varicella. For, neonates and immunocompromised patients: Varicella-zoster immunoglobulin (VZIG), IM, 0.15 mL/kg (minimum 1 mL) as a single dose within 3 days of exposure, is recommended. However, VZIG is currently not available in India.
Fever:	Paracetamol, oral, 10 mg/kg 6 hourly. OR Ibuprofen, oral, 400 mg 6 to 8 hourly (ADULT) or 10 mg/kg 6 to 8 hourly (CHILD), preferably after food.	
Pruritus:	Mild: Calamine lotion, applied 3 times daily. Severe: Promethazine, oral, 0.25–0.5 mg/kg 6 hourly.	

Vitamin A deficiency

Definition

Deficiency, usually dietary, of the fat soluble vitamin A (retinol).

Pathogenesis

Retinol is found mainly in fish liver oils, liver, egg yolk, butter, and cream. Green leafy and yellow vegetables and fruits contain beta-carotene and other provitamin carotenoids, which are converted to retinal in the mucosal cells of the small intestine. Retinal is reduced to retinol, then esterified. Most of the body's vitamin A is stored in the liver as retinyl palmitate. The 11-cis isomer of retinal is required for synthesis of photoreceptor pigments in the retina. In somatic cells, retinol is converted to retinoic acid, which combines with steroid receptors to regulate gene expression to maintain epithelial tissues and guide differentiation of a variety of other tissues.

Primary vitamin A deficiency is usually caused by prolonged dietary deprivation. Secondary deficiency may be due to inadequate conversion of carotene to vitamin A or to interference with absorption, storage, or transport of vitamin A. Interference with absorption or storage is likely in celiac disease, sprue, cystic fibrosis, pancreatic disease, duodenal bypass, congenital partial obstruction of the jejunum, obstruction of the bile ducts, giardiasis, and cirrhosis. Vitamin A deficiency is common in protein-energy malnutrition (marasmus or kwashiorkor), principally because the diet is deficient but also because vitamin A storage and transport are defective.

Diagnostic criteria

Clinical:

The severity of the effects of vitamin A deficiency is inversely related to age.

- Growth retardation is a common sign in children.
- Various ocular changes ranging from nyctalopia (night blindness) to corneal ulceration.
- Follicular hyperkeratosis of the skin is common.

The ocular manifestations of vitamin A deficiency (xerophthalmia) proceeds through fairly clear-cut stages of impaired dark adaptation and night blindness, conjunctival xerosis, Bitot's spots, corneal xerosis, and keratomalacia, corneal ulceration and blindness. Once keratomalacia supervenes with liquefaction of all or part of the cornea, blindness is almost inevitable. Vitamin A deficiency is one of the commonest causes of childhood blindness. Bitot's spots are not exclusive to vitamin A deficiency but they are pathognomic when they occur in young children who have other indications of vitamin A deficiency

In severe vitamin A deficiency in children, mortality can be 50% or more.

Investigations:

Evidence of vitamin A depletion is unobtainable in the preclinical stage, except for a history of inadequate intake.

- Plasma retinol levels fall after liver stores are exhausted.
- Other causes of night blindness (e.g., retinitis pigmentosa) must be excluded.
- Trial with therapeutic doses of vitamin A assists in the diagnosis.

Referral criteria

- Suspected very severe deficiency.
- Presence of corneal changes.
- No response to therapeutic doses of vitamin A.

Vitamin A deficiency		
	Management	**Comments**
Non-drug treatment	Early diagnosis and treatment of complications by referral to ophthalmologist whenever corneal signs are present. The diet should include dark green leafy vegetables and yellow fruits, such as papaya, carrots and mango. Infants suspected of being allergic to milk should be given adequate vitamin A in the substitute formula.	Nutrition education to parents and caregivers is an important treatment objective. Link up with Nutritional Programme is recommended.
Drug treatment	Vitamin A palmitate in oil, PO, 60,000 IU (20,000 µg) daily for 2 days and once before discharge from the hospital after 7 to 10 days is usually effective. In the presence of vomiting or malabsorption, water-miscible vitamin A must be given IM (oil preparations are not used IM). Thereafter, 10,000 IU daily for 1 month or 25,000 IU daily for 10 days may be given in oral capsule formulation as follow-up treatment.	Hospitalization may be indicated initially for supervised treatment. Prolonged daily administration of large doses, especially to infants, must be avoided because toxicity may result. To prevent deficiency prophylactic doses of 66,000 µg (200,000 IU) of vitamin A palmitate in oil orally should be given once every 6 months to all children at risk aged 1 to 4 y; the dose is halved for those < 1 y. For secondary deficiency, vitamin A supplements should be given routinely.

Assessment and management of the child with cough or difficult breathing

Adapted from: The new emergency health kit.
Geneva: World Health Organization; 1998. [WHO/DAP/98.10]

Assess the child

Ask

- How old is the child?
- Is the child coughing? For how long?
- Is the child able to drink (for children age 2 months up to 5 years)?
- Has the young infant stopped feeding well (for children less than 2 months)?
- Has the child had fever? For how long?
- Has the child had convulsions?

Look and listen (the child must be calm)

- Count the number breaths in one minute.
- Look for chest indrawing.
- Look and listen for stridor.
- Look and listen for wheeze. Is it recurrent?
- See if the child is abnormally sleepy, or difficult to wake.
- Feel for fever, or low body temperature (or measure temperature).
- Look for severe undernutrition.

Management plan for child less than 2 months old

Signs	No fast breathing (< 60 / minute) and No severe chest indrawing	Fast breathing (60 / minute or more) or Abnormally sleepy or Severe chest indrawing	Not able to drink Convulsions difficult to wake Stridor in calm child Wheezing or Fever or low temperature
Classify as	**No pneumonia – cough or cold**	**Severe pneumonia**	**Very severe disease**
Treatment	• Advise mother to give following homecare: – keep infant warm – breast-feed frequently – clear nose if it hampers feeding • Advise mother to return quickly if: – illness worsens – breathing is difficult – breathing becomes fast – feeding becomes a problem	• Refer URGENTLY to hospital • Give first dose of antibiotic • Keep infant worm If referral is not feasible, treat with an antibiotic and follow closely.	• Refer URGENTLY to hospital • Give first dose of antibiotic • Keep infant worm If referral is not feasible, treat with an antibiotic and follow closely.

Management plan for child 2 months to 5 years old

Signs	No chest indrawing and No fast breathing (50 / minute or more if child 2-12 months age; 40 / minute or more if child 1-5 years of age)	No chest indrawing and Fast breathing (50 / minute or more if child 2-12 months age; 40 / minute or more if child 1-5 years of age)	Chest indrawing	Not able to drink Convulsions Abnormally sleepy or difficult to wake Stridor in calm child or Severe undernutrition
Classify as	**No pneumonia – cough or cold**	**Pneumonia**	**Severe pneumonia**	**Very severe disease**
Treatment	• If coughing for over 30 days, refer for assessment • Assess and treat sore throat or ear problem if present • Assess and treat other problems • Advise mother to give homecare • Treat fever if present	• Advise mother to give homecare • Give an antibiotic • Treat fever if present Advise mother to return in 2 days for reassessment or if the child is getting worse.	• Refer URGENTLY to hospital • Give first dose of antibiotics • Treat fever if present If referral is not feasible, treat with an antibiotic and follow closely.	• Refer URGENTLY to hospital • Give first dose of antibiotics • Treat fever if present • If falciparum malaria is possible, give first dose of an appropriate antimalarial drug

- Refer a child who is wheezing.
- Fever alone is not reason enough to give an antibiotic, except in an infant less than 2 months age. If antibiotic is to be started, give the first dose in the clinic and instruct the mother how to give it for 5 days at home.
- Elements of home care: Feed the child (feed the child during illness, increase feeding during illness, clear the nose if it hampers feeding) and increase fluids (offer the child extra to drink, increase breastfeeding, soothe the throat and relieve cough with a safe remedy). Most important, for the child classified as having no pneumonia – cough or cold, ask the mother to watch for the following signs and return quickly if they occur – breathing becomes difficult, breathing becomes fast, child not able to drink, child becomes sicker.

Reassessing a child who is taking an antibiotic for pneumonia in 2 days

Signs	**Improving** Less fever Eating better Breathing slower	**Same as earlier**	**Worse** Not able to drink Has chest indrawing Has other danger signs
Treatment	Complete 5 day course of antibiotic	Change antibiotic OR refer	Refer URGENTLY to hospital

Assessment and management of acute diarrhea

Adapted from: The new emergency health kit.
Geneva: World Health Organization; 1998. [WHO/DAP/98.10]

Assessment of diarrheal patients for dehydration

	A	B	C
Look at			
General condition	well alert	**restless, irritable**	**lethargic or unconscious; floppy**
Eyes[1]	normal	sunken	very sunken and dry
Tears	present	absent	absent
Mouth & tongue[2]	moist	dry	very dry
Thirst	not thirsty, drinks normally	**thirsty, drinks eagerly**	**drinks poorly or not able to drink**
Feel			
Skin pinch[3]	goes back quickly	**goes back slowly**	**goes back very slowly**
Decide	the patient has *no dehydration*	If the patient has two or more signs, including at least one **bold sign**, there is *some dehydration*	If the patient has two or more signs, including at least one **bold sign**, there is *severe dehydration*
Manage	By **Treatment Plan A**	Weigh the patient, if possible, and use **Treatment Plan B**	Weigh the patient, and use **Treatment Plan C** urgently

1. In some infants and children the eyes normally appear somewhat sunken. It is helpful to ask the mother if the child's eyes are normal or more sunken than usual.
2. Dryness of the mouth and tongue can also be palpated with a clean finger. The mouth may always be dry in a child who habitually breathes through the mouth. The mouth may be wet in a dehydrated patient owing to recent vomiting or drinking.
3. The skin pinch is less useful in infants or children with marasmus (severe wasting) or kwashiorkor (severe undernutrition with edema) and in obese children.

Treatment Plan A : to treat diarrhea at home

Use this plan to teach the mother to:

- continue to treat at home her child's current episode of diarrhoea;
- give early treatment for future episodes of diarrhoea.

Explain the three rules for treating diarrhoea at home:

1. Give the child more fluids than usual to prevent dehydration

- Use recommended home fluids. These include: ORS solution, food-based fluids (such as soup, rice water and yogurt drinks) and plain water. Use of ORS solution

for children described in the box below. (Note: if the child is under 6 months and not yet taking solid food, give ORS solution or water rather than food-based fluid.)

- Give as much of these fluids as the child will take. Use the amounts shown below for ORS as a guide.
- Continue giving these fluids until the diarrhoea stops.

2. *Give the child plenty of food to prevent undernutrition*

- Continue to breast-feed frequently.
- If the child is not breast-fed, give the usual milk.
- If the child is six months or older, or already taking solid food:
  - also give cereal or another starchy food mixed, if possible, with pulses, vegetables, and meat or fish; add 1 or 2 teaspoonfuls of vegetable oil to each serving;
  - give fresh fruit juice or mashed banana to provide potassium;
  - give freshly prepared foods; cook and mash or grind food well;
  - encourage the child to eat: offer food at least 6 times a day;
  - give the same food after diarrhoea stops, and give an extra meal each day for two weeks.

3. *Take the child to a healthcare provider if the child does not get better in three days or develops any of the following :*

- many watery stools
- repeated vomiting
- marked thirst
- eating or drinking poorly
- fever
- blood in the stool

Children should be given ORS solutions at home if:

- they have been on Treatment Plan B or C;
- they cannot return to the health worker if the diarrhoea gets worse;
- it is national policy to give ORS to all children who see a health worker for diarrhoea.

If the child will be given ORS solution at home, show the mother how much ORS to give after each loose stool and give her enough packets for two days.

Age	Amount of ORS to be given after each loose stool	Amount of ORS to provide for use at home
Less than 24 months	50 – 100 mL	500 mL/day
2 to 10 years	100 – 200 mL	1,000 mL/day
10 years or more	as much as wanted	2,000 mL/day

Describe and show the amount to be given after each stool using a local measure.

Show the mother how to mix ORS.

Show her how to give ORS.

- Give a teaspoonful every 1–2 minutes for a child under 2 years.
- Give frequent sips from a cup for older children.
- If the child vomits, wait 10 minutes. Then give the solution more slowly (for example, a spoonful every 2–3 minutes).
  If diarrhoea continues after the ORS packets are used up, tell the mother to give other fluids as described in the first rule above or return for more ORS.

Treatment Plan B : to treat dehydration

Approximate amount of ORS solution to give in the first 4 hours

Age	< 4 months	4 - 11 months	12 - 23 months	2 - 4 years	5 - 14 years	≥ 15 years
Weight	< 5 kg	5 – 7.9 kg	8 – 10.9 kg	11 – 15.9 kg	16 – 29.9 kg	30 kg or more
In mL:	200 – 400	400 – 600	600 – 800	800 – 1200	1200 – 2200	2200 – 4000
In local measure						

- If the child wants more ORS than shown, give more.
- Encourage the mother to continue breast-feeding.
- For infants under six months who are not breast-fed, also give 100–200 ml clean water during this period.

Observe the child carefully and help the mother give ORS solution.

- Show her how much solution to give the child.
- Show her how to give it – a teaspoonful every 1–2 minutes for a child under 2 years, frequent sips from a cup for an older child.
- Check from time to time to see if there are problems.
- If the child vomits, wait 10 minutes and then continue giving ORS, but more slowly, for example, a spoonful every 2–3 minutes.
- If the child's eyelids become puffy, stop the ORS and give plain water or breast milk. Give ORS according to Plan A when the puffiness is gone.

After four hours, reassess the child using the assessment chart, then select Plan A, B or C to continue treatment.

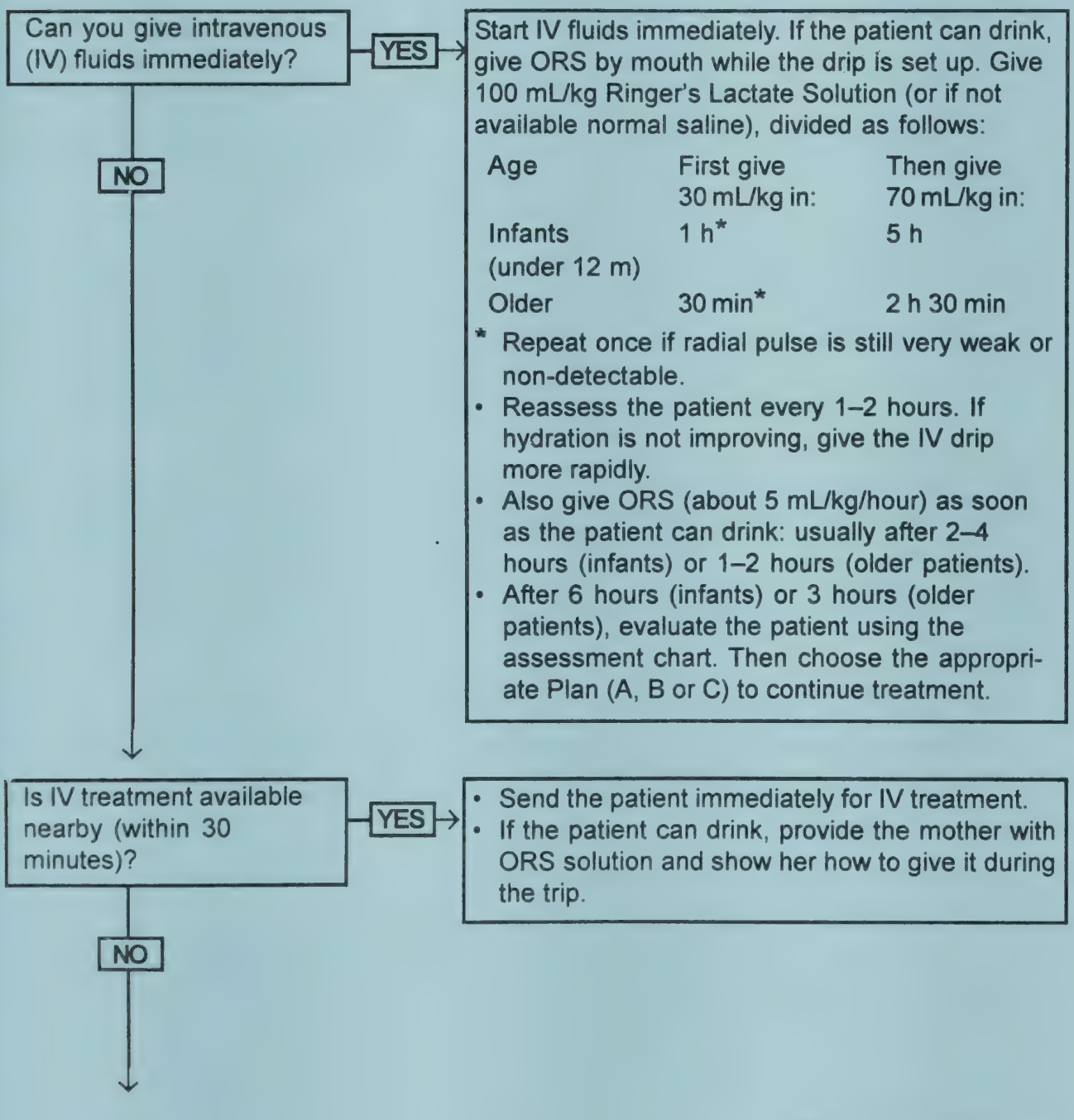
- If there are no signs of dehydration, shift to Plan A. When dehydration has been corrected, the child usually passes urine and may also be tired and fall asleep.
- If signs indicating some dehydration are still present, repeat Plan B, but start to offer food, milk and juice as described in Plan A.
- If signs indicating severe dehydration have appeared, shift to Plan C.

If the mother must leave before completing Treatment Plan B:

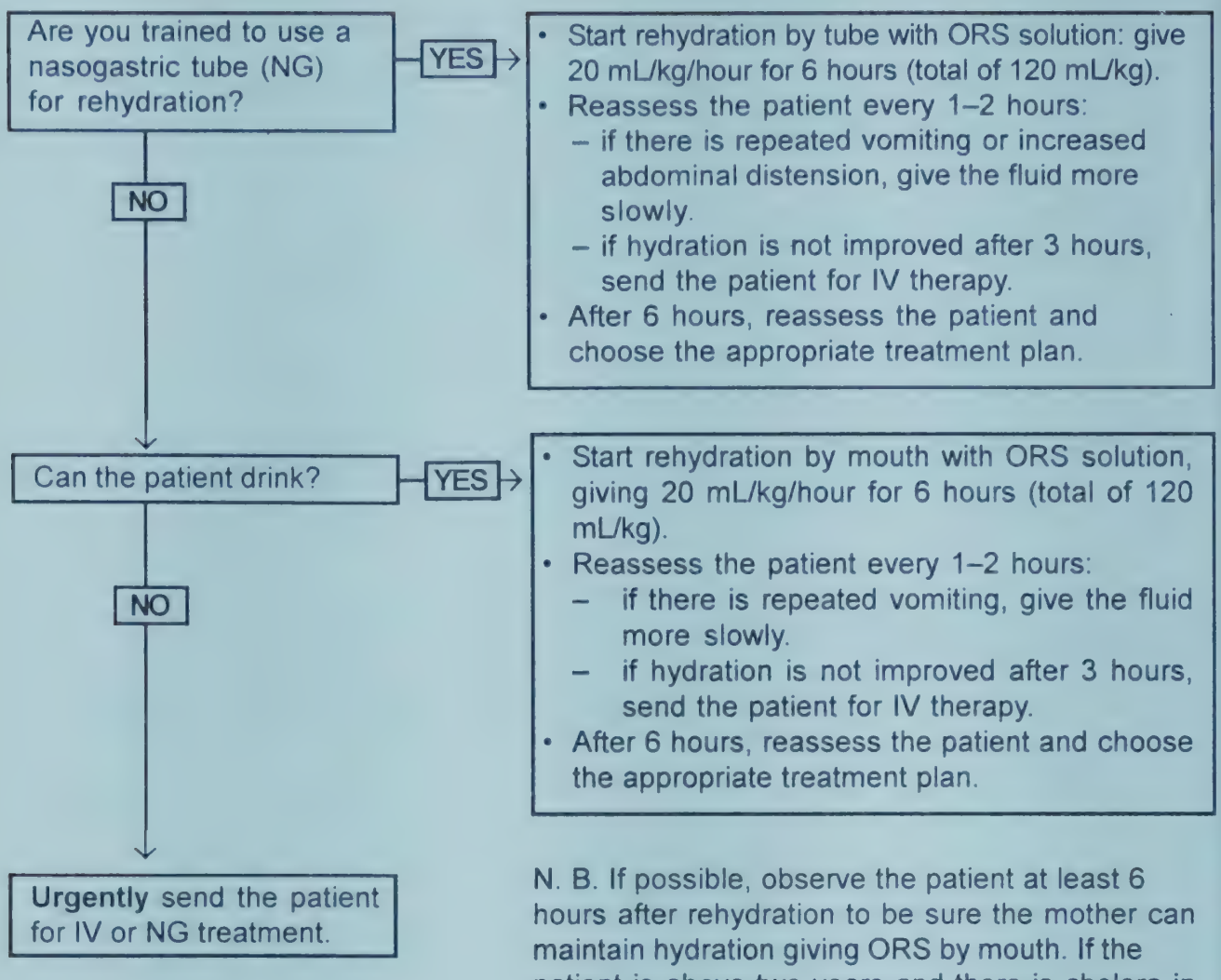
- Show her how much ORS to give to finish the 4-hour treatment at home;
- Give her enough ORS packets to complete rehydration, and for 2 more days as shown in Plan A;
- Show her how to prepare ORS solution;
- Explain to her the three rules in Plan A for treating her child at home:
  - to give ORS or other fluids until diarrhoea stops;
  - to feed the child;
  - bring the child back to the health worker, if necessary.

Treatment Plan C : to treat severe dehydration quickly

Follow the arrows. If the answer is "yes" go across. If "no" go down.


Can you give intravenous (IV) fluids immediately?
YES
NO
Start IV fluids immediately. If the patient can drink, give ORS by mouth while the drip is set up. Give 100 mL/kg Ringer's Lactate Solution (or if not available normal saline), divided as follows:
Age
First give 30 mL/kg in:
Then give 70 mL/kg in:
Infants (under 12 m)
1 h*
5 h
Older
30 min*
2 h 30 min
* Repeat once if radial pulse is still very weak or non-detectable.
• Reassess the patient every 1–2 hours. If hydration is not improving, give the IV drip more rapidly.
• Also give ORS (about 5 mL/kg/hour) as soon as the patient can drink: usually after 2–4 hours (infants) or 1–2 hours (older patients).
• After 6 hours (infants) or 3 hours (older patients), evaluate the patient using the assessment chart. Then choose the appropriate Plan (A, B or C) to continue treatment.
Is IV treatment available nearby (within 30 minutes)?
YES
NO
• Send the patient immediately for IV treatment.
• If the patient can drink, provide the mother with ORS solution and show her how to give it during the trip.

(Flow Chart Continued)


Are you trained to use a nasogastric tube (NG) for rehydration?
YES
• Start rehydration by tube with ORS solution: give 20 mL/kg/hour for 6 hours (total of 120 mL/kg).
• Reassess the patient every 1–2 hours:
– if there is repeated vomiting or increased abdominal distension, give the fluid more slowly.
– if hydration is not improved after 3 hours, send the patient for IV therapy.
• After 6 hours, reassess the patient and choose the appropriate treatment plan.
NO
Can the patient drink?
YES
• Start rehydration by mouth with ORS solution, giving 20 mL/kg/hour for 6 hours (total of 120 mL/kg).
• Reassess the patient every 1–2 hours:
– if there is repeated vomiting, give the fluid more slowly.
– if hydration is not improved after 3 hours, send the patient for IV therapy.
• After 6 hours, reassess the patient and choose the appropriate treatment plan.
NO
Urgently send the patient for IV or NG treatment.

N. B. If possible, observe the patient at least 6 hours after rehydration to be sure the mother can maintain hydration giving ORS by mouth. If the patient is above two years and there is cholera in your area, give an appropriate oral antibiotic after the patient is alert.

Use of drugs for children with diarrhea

- ANTIBIOTICS should ONLY be used for dysentery and for suspected cholera cases with severe dehydration. Otherwise they are ineffective and should NOT be given.
- ANTIPARASITIC drugs should ONLY be used for:
  - Amebiasis, after antibiotic treatment of bloody diarrhoea for *Shigella* has failed or trophozoites of *Entamoeba histolytica* containing red blood cells are seen in the feces.
  - Giardiasis, when diarrhoea has lasted at least 14 days and cysts or trophozoites of *Giardia* are seen in feces or small bowel fluid.
- ANTIDIARRHEAL DRUGS and ANTIEMETICS should NOT be used. None has proven value and some are dangerous.

National List of Essential Medicines 2003

Directorate General of Health Services
Ministry of Health & Family Welfare
Government of India

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List of participants in the preparation of National List of Essential Medicines

(i)	Dr. S. D. Seth	Chairman
(ii)	Mr. Ashwini Kumar	Member Secretary
(iii)	Dr. Y. K. Gupta, Prof. of Pharmacology, AIIMS	Member
(iv)	Dr. C. P. Singh, M. S., RML Hospital	Member
(v)	Dr. Y. N. Rao, DDG(M)	Member
(vi)	Dr. Sandeep Guleria, AIIMS	Member
(vii)	Dr. P. L. Joshi, Addl. Project Director, NACO	Member
(viii)	Dr. G. P. Sinha, Prof. of Medicine, Patna Medical College	Member
(ix)	Dr. J. N. Pandey. HOD (Medicine), AIIMS	Member
(x)	Dr. G. K. Biswas, Addl. DG (Stores)	Member
(xi)	Dr. Nikita Gupta Kamal	Member
(xii)	Dr. Rita Sood (co-opted)	Member
(xiii)	Dr. R.N. Salhan (co-opted in April 2003)	Member
(xiv)	Dr. Usha Gupta (co-opted in December 2002)	Member
(xv)	Mr. Brijesh Regal, WHO Consultant in DCG(I) office	Co-ordinator

Preface to National List of Essential Medicines 2003

The review of National Essential Drugs List 1996, was due in the context of contemporary knowledge of the therapeutic products. An expert core committee was constituted by the Director General of Health Services in June 2002 for this purpose.

The committee comprised of the following members:

1. Dr. Y. K. Gupta, Professor of Pharmacology, AIIMS, New Delhi
2. Dr. C. P. Singh, Medical Superintendent, RML Hospital, New Delhi
3. Dr. Y. N. Rao, DDG(M), DteGHS, MOHFW, New Delhi
4. Dr. Sandeep Guleria, AIIMS, New Delhi
5. Representative from ICMR, New Delhi
6. Representative from NACO, New Delhi
7. Dr. G. P. Sinha, Professor of Medicine, Patna Medical College, Patna
8. Dr. J. N. Pandey, HOD (Medicine), AIIMS, New Delhi
9. Dr. G. K. Biswas, Additional DG (Stores), DteGHS, MOHFW, New Delhi
10. Dr. Nikita Gupta Kamal, Ophthalmologist
11. Mr. Brijesh Regal, WHO Consultant in DCG(I) office
12. Mr. Ashwini Kumar, DCG(I), DteGHS, MOHFW, New Delhi

    Dr. S. D. Seth, Chair in Clinical Pharmacology, ICMR represented ICMR on the committee and was nominated by members to be the Chairman of the core committee.

    Dr. J. N. Pandey nominated Dr. Rita Sood, Additional Professor of Medicine, AIIMS, to participate in the committee's deliberations. Dr. R. N. Salhan, Medical Superintendent, RML Hospital contributed as member of the core committee, consequent to the retirement of Dr. C. P. Singh.

    Dr. P. L. Joshi was nominated by NACO as member of the committee. Dr. Usha Gupta, HOD Pharmacology, Mualana Azad Medical College, New Delhi, was co-opted as member of the committee.

After detailed deliberations in its first meeting, the committee agreed on the following criteria for identifying medicines for inclusion in the revised list:

- Consideration of relevant disease burden in the country
- Information on the efficacy, safety and comparative cost effectiveness of the products
- Preference for single active compounds
- Cost effectiveness in the context of cost of treatment

- Available health delivery infrastructure (e.g. treatment facilities, training and experience of the available personnel; availability, financial resources; and environmental factors etc.)

Addition of drugs required in emergency care/life threatening situations were also considered. The committee also decided to follow the principles and concepts of 'Essential' drugs as enunciated by WHO, as was done for the 1996 list. Accordingly, the description of the list as 'Essential Medicines' List was adopted and includes three components: a definition, a description of the selection criteria and a description of the purpose for which such a list is developed, as follows:

Definition: Essential medicines are those that satisfy the priority health care needs of the population.

Selection criteria: Essential medicines are selected with due regard to disease prevalence, evidence on efficacy and safety, and comparative cost-effectiveness.

Purpose: Essential medicines are intended to be available within the context of functioning health systems at all times in adequate amounts, in the appropriate dosage forms, with assured quality. Evidently, the word 'Essential' does not purport to convey that number of other drugs available in the market are non-essential.

Several sub-committees of clinicians were formed to review the various sub-groups of medicines and core committee members co-ordinated the proceedings of one or more of these respective sub-groups. Each of these sub-group members, and indeed all those who provided their professional inputs, were clearly explained about the fundamental doctrine of the 'essential' medicine's description as stated above.

The medicines that have finally been included in this list have gone through several intensive screenings by the expert group as well as by invited and consulted professionals. Cost of therapy was worked out especially in the context of already available therapies and keeping in view the drugs available for these categories in the WHO list of essential medicines. Essential Drugs List of various states and WHO Model Formulary (2002) were also referred during the review process. Medicines used by various national programmes and emergency care drugs etc., which were earlier identified by health care professionals in the context of drug policy, were also considered.

A new section on medicines for HIV/AIDS has been included since it was non-existent in the 1996 list. Several new anticancer drugs have been added in the current list. Additional drugs find place in the revised list.

The committee is of the opinion that since the word 'drug' is now globally considered to have a different (narcotic) connotation, it may be replaced with the word 'Medicine' a term which is now more widely used to describe therapeutic pharmaceutical substances. WHO has also renamed its list as 'Model List of Essential Medicines'. Accordingly, the present list has been titled 'National List of Essential Medicines'.

The committee gratefully acknowledges the contributions made by the following experts :

Dr. M. P. Sharma, Dr. Praveen Aggarwal, Dr. Nikhil Tandon, Dr. P. P. Kotwal, Dr. Arvind Kumar, Dr. Suresh Kumar, Dr. Rakesh Yadav, Dr. S. K. Maulik, Dr. S. C. Tiwari, Dr. Ravi Saksena, Dr. Renu Saxena, Dr. Kaushal K. Verma.

Categories of the medicines as classified in NEDL 1996 have been revised to harmonise with the latest 'Sections' used by WHO Essential Medicines List. Although WHO has published two separate lists in its latest revision (core list and complementary list) the committee has taken a conscious decision to keep the core and complementary medicines together in the main list itself. The complementary medicines have been marked * and denote those medicines which may be needed when other medicines listed in the category are not readily available or they may be required in specific situations or locations for well founded reasons.

The committee observed that critical care or emergency care medicines are many times perceived as 'life saving drugs' though this is not a standard terminology in the context of overall use of medicinal products. It would be seen that the essential medicines list consists of medicines meant for the management of a wide variety of conditions ranging from symptomatic relief, public health care, management of infections as well as for 'life threatening' emergency situations and for critical care.

An index of therapeutic categories has been included in the final version for ease of reference. The nomenclature of medicines has been made consistent with that used in India [e.g. Epinephrine has been changed to Adrenaline and first letters of names of the medicines have been made capital, as in Indian Pharmacopoeia (I.P.)].

It is felt that this list may be reviewed every two years to keep it relevant in the context of contemporary knowledge and drugs that keep appearing on the horizon.

The committee gratefully acknowledges the support provided by WHO-India Country Office for the review process as well as for dissemination of this list.

Preface to National Essential Drugs List 1996

1. The Ministry of Health, Government of India, is pleased to introduce the National Essential Drugs List for adoption in the country. The list is modelled on the WHO Essential Drugs List, and follows the general principles enunciated by WHO in the preparation of such lists.

2. In India, healthcare is provided by both Private and Public Sectors. It is the responsibility of the Public Sector to establish healthcare institutions accessible to all sections of the population in all parts of the country, to provide diagnostic and treatment facilities. However, the state has not accepted the responsibility of supplying the entire requirement of drugs to treat all the patients receiving treatment in state-funded institutions. At the levels of Central and State Governments, medicines are supplied free of cost or against

token payment to the government employees, and free of cost to the weaker section of the population who avail of the treatment facilities provided by the Government through primary, secondary or tertiary levels of state healthcare institutions. Through different National Programmes for the control of diseases of high morbidity and endemicity drugs are also supplied to effect a cure to all patients who approach the treatment centres established under such programmes.

3. The National Essential Drugs List implies that the drugs included in it are adequate to meet the common contemporary health needs of the general population of the country and general obligation of the health administrators to ensure abundant availability of such drugs in the country. The drugs included in this list are generally safe and effective, and are approved by the Drugs Controller General, India, and are currently available at affordable prices to the general public.

4. The exclusion in the National List of any drug which is currently available and recommended by the physicians does not imply that they are less effective or unsuitable to the Indian patients. Their exclusion may have been influenced by one or more of the following factors-cost benefit ratio, dependence on imports or imported raw materials, indicated in the treatment of diseases not considered significant in the National context, insufficient experience with the drug in India, not approved for use in the specific indication by the Drugs Controller General, India, or for which no standard is approved under the Drugs & Cosmetics Act and Rules. The safety, efficacy and quality of the drugs currently available in India are according to the standards prescribed in India and the exclusion of any drug from this list does not mean that it is less effective in comparison to any alternative drug which has found its place in the list.

5. The national list is not intended as an imposition on the rights of state governments, government institutions, or private health care providers. It is meant to be used as a guideline to the concept of rational therapeutics and as an indicator of availability in the country. While the drugs selected are considered adequate to treat diseases common to most parts of the country, it is appreciated that specific regional requirements for drugs to treat diseases of local importance may not be available in the National List, and in such instances it will be appropriate for the state health administration (adopting the National List) to include drugs as may be considered adequate to treat these diseases.

6. A committee of experts was constituted by the DGHS in February, 1996, to prepare the National Essential Drugs List. This committee selected a core group comprising of: Dr. P. Das Gupta, Dr. S. D. Seth, Dr. C. B. Sridhar, Dr. M. R. Samuel, Dr. J. N. Mohanty, Dr. G. K. Biswas and Dr. J. S. Bapna to prepare a preliminary list. The core group took note of the procurement of State Governments, different Central Government institutions (e.g. CGHS, ESIC, GMSD,

etc.) and WHO Essential Drugs List. The tentative list was subjected to scrutiny for therapeutic efficacy, availability and cost-effectiveness by the core group in consultation with experts in different disciplines of medicine. The draft was finally adopted in the meeting of experts held on 4th April, 1996.

7. The list is intended to be a dynamic document, subject to change, with addition and/or deletions, as medical knowledge advances and new drugs become available at remunerative pricing. The list uses generic names for scientific clarity.

8. For convenience and ease of comparison, the same category numbers and headings have been used as in the WHO Model List (1995). However, only the names of the active bases have been used, avoiding the mention of salts or esters, e.g. morphine instead of morphine sulphate. The quantity mentioned in the strength of the dosage forms refers to the base unless by established practice or by pharmacopoeial standard it refers to the salt or the ester. The quality control standards are as in Indian Pharmacopoeia unless the drug is not included in I.P.

9. Drugs marked with an asterisk (*) are to be considered as complementary drugs, i.e. those that are used if the other drugs in the category are not available or they are required for specific patients, situations or locations for valid reasons.

10. The names of drugs are followed by the following letters to indicate their need at various levels of medical care:

    - P Primary health care
    - S Secondary health care
    - T Tertiary health care
    - U Universal

11. Although the drugs are listed by therapeutic categories, these are not necessarily meant to be used as prescribing guidelines. A drug that may deserve to be included in a particular category may not be found in the category as it may already be included in another category.

Acknowledgement

Our acknowledgements are due to Dr. Annapurna Rao, Dr. Ranjit Ray Chowdhury, Mr. Adeep Bagati, Dr. M. R. Samuel, Dr. S. D. Seth and Dr. J. S. Bapna for their valuable assistance and time to enable this first National Essential Drugs List to come out in such a short time. We are grateful to SEARO, WHO for their guidance and financial help for printing this list.

Dr. P. Das Gupta
Member-Secretary Expert Committee
New Delhi April 22, 1996.

A list of items not included in the 1996 edition but added in this edition is given below:

Sl. No.	Name of the drug	Category
1.	Adenosine	12.2
2.	Alpha interferon	8.2
3.	Alprazolam	24.3
4.	Artesunate	6.5.3.1
5.	Azithromycin	6.2.2
6.	Betaxolol hydrochloride	21.4
7.	Bretylium tosylate	12.2
8.	Bromocriptine mesylate	9.0
9.	Calcium gluconate	4.2
10.	Cefotaxime	6.2.1
11.	Ceftazidime	6.2.1
12.	Ceftriaxone	6.2.1
13.	Cefuroxime	6.2.1
14.	Clarithromycin	6.2.2
15.	Clomiphene citrate	18.6
16.	Clonidine hydrochloride	12.3
17.	Clotrimazole	6.3
18.	Colchicine	2.3
19.	Cryoprecipitate	11.2
20.	Dexchlorpheniramine maleate	3
21.	Didanosine	6.4.2.1
22.	Doxapram	1.4
23.	Efavirenz	6.4.2.2
24.	Esmolol	12.2
25.	Fluconazole	6.3
26.	Flumazenil	4.2
27.	Flucytosine	6.3
28.	Flutamide	8.2
29.	Fresh frozen plasma	11.1
30.	Gemcitabine hydrochloride	8.2
31.	Glucagon	18.5.2
32.	Hormone releasing IUD	18.3.1
33.	Indinavir	6.4.2.3
34.	Lamivudine + Nevirapine + Stavudine	6.4.2.1

35.	Lamivudine + Zidovudine	6.4.2.1
36.	Lamivudine	6.4.2.1
37.	Losartan potassium	12.3
38.	Magnesium sulphate	5
39.	Medroxyprogesterone acetate	18.7
40.	Methyl cellulose	
41.	Metoprolol	12.1
42.	Midazolam	1.3
43.	Mifepristone	22.1
44.	N/2 saline	26.2
45.	N/5 saline	26.2
46.	Nelfinavir	6.4.2.3
47.	Nevirapine	6.4.2.2
48.	Nitrazepam	24.3
49.	Ondansetron	8.4
50.	Ofloxacin	6.2.4
51.	Omeprazole	17.1
52.	Paclitaxel	8.2
53.	Physostigmine salicylate	21.4
54.	Platelet rich plasma	11.2
55.	Potassium chloride	26.2
56.	Pyridostigmine bromide	20
57.	Pyrimethamine	6.5.3.1
58.	Raloxifene	8.3
59.	Ritonavir	6.4.2.3
60.	Roxithromycin	6.2.2
61.	Saquinavir	6.4.2.3
62.	Sodium bicarbonate	26.2
63.	Stavudine	6.4.2.1
64.	Sulphadiazine	6.2.2
65.	Terazosin	12.3
66.	Thiacetazone + Isoniazid	6.2.4
67.	Trifluoperazine	24.1
68.	Trimethoprim	6.5.4
69.	Vancomycin hydrochloride	6.2.2
70.	Zidovudine	6.4.2.1
71.	Zinc oxide	13.4

A list of items included in the 1996 edition but not included in this edition is given below:

Sl. No.	Name of the drug	Category
1.	Biperiden	9
2.	Ethinylestradiol + Norgestrel	18.3
3.	Neomycin	6.2.2

List of drug movement across categories:

Sl. No.	Name of the drug	Category from	Category to
1.	Acetylsalicylic acid	12.6	12.5
2.	Acyclovir	6.5	6.4.1
3.	Allopurinol	2.1	2.3
4.	Amitriptyline	24.2	24.2.1
5.	BCG vaccine	19.3	19.3.1
6.	Centchroman	18.3	18.3.4
7.	DPT vaccine	19.3	19.3.1
8.	Diloxanide furoate	6.4.1	6.5.1
9.	Dobutamine	12.5	12.4
10.	Dopamine	12.5	12.4
11.	Ethinylestradiol + Levonorgestrel	18.3	18.3.1
12.	Ethinylestradiol + Norethisterone	18.3	18.3.1
13.	Fluoxetine	24.2	24.2.2
14.	Furazolidone	17.7	17.7.2
15.	Hepatitis b vaccine	19.3	19.3.1
16.	Imipramine	24.2	24.2.1
17.	IUD containing copper	18.3	18.3.2
18.	Loperamide	17.7	17.7.2
19.	Measles vaccine	19.3	19.3.1
20.	Metronidazole	6.4.1	6.5.1
21.	Oral poliomyelitis vaccine	19.3	19.3.1

22.	Oral rehydration salts	17.7	17.7.1
23.	Pentamidine	6.4.2	6.5.2
24.	Praziquantel	6.1.1	6.1.3
25.	Rabies vaccine	19.3	19.3.2
26.	Sodium stibogluconate	6.4.2	6.5.2
27.	Streptokinase	12.6	12.5
28.	Sulphadoxine + Pyrimethamine	6.4.3	6.5.3.2
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Therapeutic categories

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Items with asterisk in the following list denote complementary items

1. Anaesthetics

1.1 *General anaesthetics and oxygen*

Ether, Anaesthetic	S, T	Inhalation	
Halothane	S, T	Inhalation	
Isoflurane*	S, T	Inhalation	
Ketamine hydrochloride	U	Injection	10 mg / ml, 50 mg / ml
Nitrous oxide	U	Inhalation	
Oxygen	U	Inhalation	
Thiopentone sodium	S, T	Injection	0.5 g, 1 g powder

1.2 *Local anaesthetics*

Bupivacaine hydrochloride	S, T	Injection	0.25%, 0.5%
			0.5% + 7.5% Glucose
Ethyl Chloride	U	Spray	1%
Lignocaine hydrochloride	U	Topical forms	2-5%
		Injection	1-2%
		Injection (Spinal)	5% + 7.5% Glucose
Lignocaine	U	Injection	1%, 2%
+ Adrenaline			+ Adrenaline 1:200,000

1.3 *Preoperative medication and sedation for short term procedures*

Atropine sulphate	U	Injection	0.6 mg / ml
Diazepam	U	Tablets	5 mg
		Injection	5 mg / ml
Midazolam	U	Injection	1 mg / ml, 5 mg / ml
Morphine sulphate	S, T	Injection	10 mg / ml
Promethazine	U	Syrup	5 mg / 5 ml

1.4 *Postoperative Respiratory Stimulant*

Doxapram*	T	Injection	4 mg / ml

2. Analgesics, antipyretics, non-steroidal anti-inflammatory medicines, medicines used to treat gout and disease modifying agents used in rheumatoid disorders

2.1 *Non-opioid analgesics, antipyretics and non-steroidal anti-inflammatory medicines*

Acetylsalicylic Acid	U	Tablets	300 - 350 mg
Diclofenac	T	Tablets	50 mg, 100 mg
		Injection	25 mg / ml
Ibuprofen	U	Tablets	200 mg, 400 mg
Paracetamol	U	Injection	150 mg / ml
		Syrup	125 mg / 5ml
		Tablets	500 mg

2.2	*Opioid analgesics*			
	Morphine	S, T	Injection	10 mg / ml
			Tablets	10 mg
	Pentazocine	S, T	Injection	30 mg / ml
			Tablets	25 mg
	Pethidine hydrochloride	S, T	Injection	50 mg / ml
2.3	*Medicines used to treat gout*			
	Allopurinol	S, T	Tablets	100 mg
	Colchicine	S, T	Tablets	0.5 mg
2.4	*Disease modifying agents used in rheumatoid disorders*			
	Azathioprine	S, T	Tablets	50 mg
	Chloroquine phosphate	S, T	Tablets	150 mg
	Methotrexate	S, T	Tablets	2.5 mg
	Sulfasalazine	S, T	Tablets	500 mg
3.	**Antiallergics and medicines used in anaphylaxis**			
	Adrenaline bitartrate	U	Injection	1 mg / ml
	Chlorpheniramine maleate	U	Tablets	4 mg
	Dexchlorpheniramine maleate		Syrup	0.5 mg / 5 ml
	Dexamethasone	U	Tablets	0.5 mg
			Injection	4 mg / ml
	Hydrocortisone sodium succinate	U	Injection	100 mg
	Pheniramine maleate	U	Injection	22.75 mg / ml
	Prednisolone	S	Tablets	5 mg
	Promethazine	U	Tablets	10 mg, 25 mg
			Syrup	5 mg / 5 ml
4.	**Antidotes and other substances used in poisonings**			
4.1	*Nonspecific*			
	Activated charcoal	U	Powder	
	Atropine sulphate	U	Injection	0.6 mg / ml
4.2	*Specific*			
	Antisnake venom serum, Polyvalent	U	Injection	10 ml
	Calcium gluconate	S,T	Injection	100 mg / ml
	Desferrioxamine mesylate	S, T	Injection	500 mg
	Dimercaprol	S, T	Injection in oil	50 mg / ml
	Flumazenil*	T	Injection	0.1 mg / ml
	Methylthioninium chloride (Methylene blue)	S, T	Injection	10 mg / ml
	Naloxone	S, T	Injection	0.4 mg / ml

	Penicillamine	S, T	Tablets or Capsules	250 mg
	Pralidoxime chloride	S, T	Injection	25 mg / ml
	Sodium nitrite	S, T	Injection	30 mg / ml
	Sodium thiosulphate	S, T	Injection	250 mg/ ml
5.	**Anticonvulsants / Antiepileptics**			
	Carbamazepine	U	Tablets	100 mg, 200 mg
			Syrup	20 mg / ml
	Diazepam	U	Injection	5 mg / ml
	Magnesium sulphate	T	Injection	500 mg /ml
	Phenobarbitone	U	Tablets	30 mg, 60 mg
		ST	Injection	200 mg / ml
	Phenytoin sodium	U	Capsules or	
			Tablets	50 mg, 100 mg
			Syrup	25 mg / ml
			Injection	50 mg / ml
	Sodium valproate	U	Tablets	200 mg, 500 mg
			Syrup	200 mg / 5 ml
6.	**Anti-infective medicines**			
6.1	*Anthelmintics*			
6.1.1	*Intestinal anthelmintics*			
	Albendazole	U	Tablets	400 mg
			Suspension	200 mg/ 5 ml
	Mebendazole	U	Tablets	100 mg
			Suspension	100 mg / 5 ml
	Niclosamide	U	Chewable	
			Tablets	500 mg
	Pyrantel pamoate	U	Tablets	250 mg
			Suspension	250 mg / 5 ml
6.1.2	*Antifilarials*			
	Diethylcarbamazine citrate	U	Tablets	50 mg
6.1.3	*Antischistosomal and antitrematode medicines*			
	Praziquantel	S, T	Tablets	600 mg
6.2	*Antibacterials*			
6.2.1	*Beta-lactam medicines*			
	Amoxicillin	U	Capsules	250 mg 500 mg
			Powder for suspension	125 mg / 5 ml
	Ampicillin	U	Capsules	250 mg, 500 mg
			Powder for suspension	125 mg / 5 ml

		Injection	500 mg
Benzathine Benzylpenicillin	U	Injection	6 lacs, 12 lacs, 24 lacs units
Benzylpenicillin	U	Injection	5 lacs, 10 lacs units
Cefotaxime*	S, T	Injection	125, 250, 500 mg
Ceftazidime*	S, T	Injection	250 mg, 1g
Ceftriaxone*	S, T	Injection	250 mg, 1 g
Cefuroxime*	S, T	Injection	250 mg,750 mg
Cloxacillin	U	Capsules	250 mg, 500 mg
		Liquid	125 mg / 5 ml
		Injection	250 mg
Procaine Benzylpenicillin	U	Injection	Crystalline penicillin (1 lac units) + Procaine penicillin (3 lacs units)
6.2.2 Other antibacterials			
Amikacin*	S, T	Injection	250 mg / 2 ml
Azithromycin*	S, T	Capsules or Tablets	100, 250, 500 mg
		Suspension	100 mg / 5 ml
		Injection	500 mg
Cephalexin*	U	Capsules	250 mg, 500 mg
		Syrup	125 mg / 5 ml
Clarithromycin*	S, T	Capsules	500 mg
Chloramphenicol	S, T	Capsules, Tablets	250 mg,500 mg
		Suspension	125 mg / 5 ml
		Injection	1 g
Ciprofloxacin	U	Tablets	250 mg, 500 mg
		Injection	200 mg / 100 ml
Co-trimoxazole (Trimethoprim + Sulphamethoxazole)	U	Tablets	40 mg + 200 mg, 80 mg + 400 mg
		Suspension	40 mg + 200 mg / 5 ml
Doxycycline	U	Capsules	100 mg
Erythromycin estolate	U	Syrup	125 mg / 5 ml
		Tablets	250 mg, 500 mg
Gentamicin	U	Injection	10 mg / ml, 40 mg / ml
Metronidazole	U	Tablets	200 mg, 400 mg
		Injection	500 mg / 100 ml
Nalidixic Acid	U	Tablets	250 mg, 500 mg
Nitrofurantoin	U	Tablets	100 mg
Norfloxacin	U	Tablets	400 mg
Roxithromycin*	S, T	Tablets	50 mg, 150 mg

Sulphadiazine*	S, T	Tablets	500 mg
Tetracycline	U	Tablets or	
		Capsules	250 mg
Vancomycin hydrochloride*	T	Injection	500 mg, 1 g
6.2.3 Antileprosy medicines			
Clofazimine	S, T	Capsules	50 mg, 100 mg
Dapsone	U	Tablets	50 mg, 100 mg
Rifampicin	U	Capsules or	
		Tablets	150 mg, 300 mg
6.2.4 Antituberculosis medicines			
Ethambutol	U	Tablets	200, 400, 600, 800 mg
Isoniazid	U	Tablets	50, 1000, 300 mg
Ofloxacin*	S, T	Tablets	100 mg, 200 mg
		Syrup	50 mg / 5 ml
Pyrazinamide	U	Tablets	500, 750, 1000, 1500 mg
Rifampicin	U	Capsules	50, 150, 300, 450 mg
		Syrup	100 mg / 5 ml
Streptomycin	U	Injection	0.75 g, 1 g
Thiacetazone + Isoniazid	S, T	Tablets	150 mg + 300 mg
6.3 Antifungal medicines			
Amphotericin B	S, T	Injection	50 mg
Clotrimazole	U	Pessaries	100 mg, 200 mg
		Gel	2%
Fluconazole	S, T	Capsules or	
		Tablets	50, 100, 150, 200 mg
Flucytosine	S, T	Capsules	250 mg
Griseofulvin	U	Capsules or	
		Tablets	125 mg, 250 mg
Ketoconazole	S, T	Tablets	200 mg
Nystatin	U	Tablets	500,000 IU
		Pessaries	100,000 IU
6.4 Antiviral medicines			
6.4.1 Antiherpes medicines			
Acyclovir*	S, T	Tablets	200 mg, 400 mg
		Suspension	400 mg / 5 ml
		Injection	250 mg, 500 mg
*6.4.2 Antiretroviral medicines**			
6.4.2.1 Nucleoside reverse transcriptase inhibitors			
Didanosine*	S, T	Tablets	250 mg, 400 mg
Lamivudine*	S, T	Tablets	150 mg
Lamivudine + Nevirapine	S, T	Tablets	150 mg + 200 mg

+ Stavudine*			+ 30 mg
Lamivudine + Zidovudine*	S, T	Tablets	150 mg + 300 mg
Stavudine*	S, T	Capsules	15 mg, 30 mg, 40 mg
Zidovudine*	S, T	Tablets	100 mg, 300 mg
6.4.2.2 Non-nucleoside reverse transcriptase inhibitors			
Efavirenz*	S, T	Capsules	200 mg, 600 mg
Nevirapine*	S, T	Capsules	200 mg
		Suspension	50 mg / 5 ml
6.4.2.3 Protease inhibitors			
Indinavir*	S, T	Capsules	200 mg, 400 mg
Nelfinavir*	S, T	Capsules	250 mg
Ritonavir*	S, T	Capsules	100 mg
		Syrup	400 mg / ml
Saquinavir*	S, T	Capsules	200 mg
6.5 Antiprotozoal medicines			
6.5.1 Antiamoebic and antigiardiasis medicines			
Diloxanide Furoate	U	Tablets	500 mg
Metronidazole	U	Tablets	200 mg, 400 mg
		Injection	500 mg /100 ml
Tinidazole	U	Tablets	500 mg
6.5.2 Antileishmaniasis medicines			
Amphotericin B	S, T	Injection	50 mg
Pentamidine isothionate	S, T	Injection	200 mg
Sodium stibogluconate	S, T	Injection	100 mg / ml
6.5.3 Antimalarial medicines			
6.5.3.1 For curative treatment			
Artesunate	T	Injection	60 mg
Chloroquine phosphate	U	Tablets	150 mg base
		Injection	40 mg / ml
		Syrup	50 mg / 5 ml
Primaquine phosphate	U	Tablets	2.5 mg, 7.5 mg
Pyrimethamine	U	Tablets	25 mg
Quinine sulphate	U	Tablets	300 mg
	S, T	Injection	300 mg / ml
Sulfadoxine + Pyrimethamine	U	Tablets	500 mg + 25 mg
6.5.3.2 For prophylaxis			
Chloroquine phosphate	U	Tablets	150 mg base
		Syrup	50 mg / 5 ml
6.5.4 Antipneumocystosis and antitoxoplasmosis medicines			
Co-trimoxazole (Trimethoprim + Sulphamethoxazole)	U	Tablets	40 mg + 200 mg, 80 mg + 400 mg

			Syrup	40 mg + 200 mg / 5 ml
	Pentamidine isothionate	S, T	Injection	200 mg
	Trimethoprim	U	Tablets	100 mg
7.	**Antimigraine medicines**			
7.1	*For treatment of acute attack*			
	Acetyl Salicylic Acid	U	Tablets	300 - 350 mg
	Dihydroergotamine	S, T	Tablets	1 mg
	Paracetamol	U	Tablets	500 mg
7.2	*For prophylaxis*			
	Propranolol	U	Tablets	10 mg, 40 mg
8.	**Antineoplastic, immunosuppressives and medicines used in palliative care**			
8.1	*Immunosuppressive medicines*			
	Azathioprine*	T	Tablets	50 mg
	Cyclosporine	T	Capsules	10, 25, 50, 100 mg
			Concentrate for Injection	100 mg / ml
8.2	*Cytotoxic medicines*			
	Actinomycin D*	T	Injection	0.5 mg
	Alpha Interferon*	T	Injection	3 million IU
	Bleomycin*	T	Injection	15 mg
	Busulphan*	T	Tablets	2 mg
	Cisplatin*	T	Injection	10 mg, 50 mg
	Cyclophosphamide*	T	Tablets	50 mg
			Injection	200 mg, 500 mg
	Cytosine arabinoside*	T	Injection	100 mg, 500 mg, 1000 mg
	Danazol*	T	Capsules	50 mg, 100 mg
	Doxorubicin*	T	Injection	10 mg 50 mg
	Etoposide*	T	Capsules	100 mg
			Injection	100 mg / 5 ml
	Flutamide*	T	Tablet	250 mg
	5-Fluorouracil*	T	Injection	250 mg / 5 ml
	Folinic Acid*	T	Injection	3 mg / ml
	Gemcitabine hydrochloride	T	Injection	200 mg, 1 g
	L- Asparaginase*	T	Injection	10000 KU
	Melphalan*	T	Tablets	2 mg, 5 mg
	Mercaptopurine*	T	Tablets	50 mg
			Injection	100 mg / ml
	Methotrexate*	T	Tablets	2.5 mg
			Injection	50 mg / ml
	Mitomycin-C*	T	Injection	10 mg

	Paclitaxel*	T	Injection	30 mg / 5 ml
	Procarbazine*	T	Capsules	50 mg
	Vinblastine*	T	Injection	10 mg
	Vincristine	T	Injection	1 mg / ml
8.3	*Hormones and antihormones*			
	Prednisolone*	S, T	Tablets	5 mg, 20 mg
			Injection	25 mg (as sodium phosphate or succinate)
	Raloxifene*	T	Tablets	60 mg
	Tamoxifen citrate*	T	Tablets	10 mg, 20 mg
8.4	*Medicines used in palliative care*			
	Morphine sulphate*	T	Tablets	10 mg
	Ondansetron*	S, T	Tablets	4 mg, 8 mg
			Syrup	2 mg / 5 ml
			Injection	2 mg / ml
9.	**Antiparkinsonism medicines**			
	Bromocriptine mesylate	S, T	Tablets	1.25 mg, 2.5 mg
	Levodopa + Carbidopa	U	Tablets	100 mg + 10 mg, 250 mg + 25 mg, 100 mg + 25 mg
	Trihexyphenidyl hydrochloride	U	Tablets	2 mg
10.	**Medicines affecting the Blood**			
10.1	*Antianemia medicines*			
	Cyanocobalamin	U	Injection	1 mg / ml
	Ferrous Salt	U	Tablets	60 mg elemental iron (equivalent)
			Oral solution	25 mg elemental iron (as sulphate) / ml
	Folic Acid	U	Tablets	1 mg, 5 mg
	Iron Dextran	S, T	Injection	50 mg iron / ml
	Pyridoxine	U	Tablets	5 mg
10.2	*Medicines affecting coagulation*			
	Acenocoumarol*	S, T	Tablets	1 mg, 2 mg, 4 mg
	Heparin Sodium	S, T	Injection	1000 IU / ml 5000 IU / ml
	Menadione Sodium Sulphite	S, T	Tablets	10 mg
	Protamine Sulphate	S, T	Injection	10 mg / ml
	Phytomenadione	S, T	Injection	10 mg / ml
	Warfarin sodium	S, T	Tablets	5 mg

11.	**Blood products and plasma substitutes**			
11.1	*Plasma substitutes*			
	Dextran-40	U	Injection	10%
	Dextran-70	U	Injection	6%
	Fresh frozen plasma*	T	Injection	
	Hydroxyethyl starch (Hetastarch)	S, T	Injection	6%
	Polygeline	S, T	Injection	3.5%
11.2	*Plasma fractions for specific use*			
	Albumin	S, T	Injection	5%, 20%
	Cryoprecipitate of plasma	S, T	Injection	
	Factor VIII concentrate*	S, T	Injection	Dried
	Factor IX Complex* (Coagulation factors II,VII, IX, X)	S, T	Injection	Dried
	Platelet rich plasma	S, T	Injection	
12.	**Cardiovascular medicines**			
12.1	*Antianginal medicines*			
	Acetyl Salicylic Acid*	U	Tablets	75 mg, 100 mg, 350 mg
	Diltiazem	S, T	Tablets	30 mg, 60 mg
	Glyceryl trinitrate	U	Sublingual Tablets	0.5 mg
			Injection	5 mg / ml
	Isosorbide mononitrate	U	Tablets	10 mg, 20 mg
	Isosorbide dinitrate			
	Metoprolol*	U	Tablets	25 mg, 50 mg
			Injection	1 mg / ml
	Propranolol	U	Tablets	10 mg, 40 mg
			Injection	1 mg / ml
12.2	*Antiarrhythmic medicines*			
	Adenosine*	S, T	Injection	3 mg / ml
	Amiodarone	S, T	Tablets	100 mg, 200 mg
			Injection	150 mg
	Bretylium tosylate*	T	Injection	1 mg, 2 mg, 4 mg / ml
	Diltiazem	S, T	Tablets	30 mg, 60 mg
	Diltiazem*	T	Injection	5 mg / ml
	Esmolol*	T	Injection	10 mg / ml
	Isoprenaline hydrochloride*	T	Injection	2 mg / ml
	Lignocaine	S, T	Injection	1%, 2%
	Mexiletine hydrochloride	S, T	Capsules	50 mg, 150 mg
			Injection	25 mg / ml
	Procainamide hydrochloride	T	Tablets	250 mg

			Injection	100 mg / ml
	Quinidine	T	Tablets	100 mg
	Verapamil	S, T	Tablets	40 mg, 80 mg
			Injection	2.5 mg / ml
12.3	*Antihypertensive medicines*			
	Amlodipine	U	Tablets	2.5 mg, 5 mg, 10 mg
	Atenolol	U	Tablets	50 mg, 100 mg
	Chlorthalidone*	U	Tablets	25 mg, 50 mg
	Clonidine hydrochloride*	S, T	Tablets	100 mcg, 150 mcg
	Enalapril maleate	U	Tablets	2.5 mg, 5 mg, 10 mg
			Injection	1.25 mg / ml
	Losartan potassium*	S, T	Tablets	25 mg, 50 mg
	Methyldopa	U	Tablets	250 mg
	Nifedipine	S, T	Capsules	5 mg, 10 mg
			Tablets	10 mg, 20 mg
			Sustained release Capsules or tablets	10 mg, 20 mg
	Propranolol	U	Tablets	10 mg, 40 mg
	Sodium nitroprusside	T	Injection	50 mg / 5 ml
	Terazosin*	S, T	Tablets	1 mg, 2 mg, 5 mg
12.4	*Medicines used in heart failure*			
	Digoxin	S, T	Tablets	0.25 mg
			Elixir	0.05 mg / ml
			Injection	0.25 mg / ml
	Dobutamine*	S, T	Injection	50 mg / ml
	Dopamine	S,T	Injection	40 mg / ml
12.5	*Antithrombotic medicines*			
	Acetyl Salicylic Acid	U	Tablets	75 mg, 100 mg
	Heparin sodium*	S, T	Injection	1000 IU / ml, 5000 IU / ml
	Streptokinase*	S, T	Injection	750,000 IU, 15,00,000 IU
	Urokinase*	T	Injection	500,000 IU / ml, 10,00,000 IU / ml
13.	**Dermatological medicines (Topical)**			
13.1	*Antifungal medicines*			
	Benzoic acid + Salicylic Acid	U	Ointment or Cream	6% + 3%
	Miconazole	U	Ointment or Cream	2%

13.2	*Anti-infective medicines (other)*			
	Acyclovir	S, T	Cream	5%
	Framycetin sulphate	U	Cream	0.5%
	Methylrosanilinium chloride (Gentian violet)	U	Aqueous solution	0.5%
	Neomycin + Bacitracin	U	Ointment	5 mg + 500 IU
	Povidone Iodine	U	Solution or Ointment	5%
	Silver Nitrate	U	Lotion	10%
	Silver sulphadiazine	U	Cream	1%
13.3	*Anti-inflammatory and antipruritic medicines*			
	Betamethasone dipropionate	U	Cream or Ointment	0.05%
	Calamine	U	Lotion	
13.4	*Astringent medicines*			
	Zinc Oxide	U	Dusting powder	
13.5	*Medicines affecting skin differentiation and proliferation*			
	Coal Tar	U	Solution	5%
	Dithranol*	T	Ointment	0.1-2%
	Glycerin	U	Solution	
	Salicylic Acid	U	Solution	5%
13.6	*Scabicides and pediculicides*			
	Benzyl Benzoate	U	Lotion	25%
	Gamma-benzene hexachloride	U	Lotion	1%
14.	**Diagnostic agents**			
14.1	*Ophthalmic medicines*			
	Fluorescein	S, T	Eye drops	1%
	Lignocaine	S, T	Eye Drops	4%
	Tropicamide	S, T	Eye drops	1%
14.2	*Radiocontrast media*			
	Barium sulphate	S, T	Suspension	100% w/v, 250% w/v
	Calcium ipodate	S, T	Injection	3 g
	Iopanoic acid	S, T	Tablets	500 mg
	Meglumine iothalamate	S, T	Injection	60% w/v (iodine = 280 mg / ml)
	Meglumine iotroxate	S, T	Solution	5-8 g iodine in 100-250 ml
	Propyliodone	S, T	Oily suspension	500-600 mg / ml
	Sodium iothalamate	S, T	Injection	70% w/v (Iodine = 420 mg / ml)

	Sodium meglumine diatrizoate	S, T	Injection	60% w/v (Iodine = 292 mg / ml) 76% w/v (Iodine 370 mg / ml)
15.	**Disinfectants and antiseptics**			
15.1	*Antiseptics*			
	Acriflavin + Glycerin	U	Solution	
	Benzoin, Compound	U	Tincture	
	Cetrimide	U	Solution	20% (conc. for dilution)
	Chlorhexidine	U	Solution	5% (conc. for dilution)
	Ethyl alcohol	70%	U	Solution
	Gentian violet	U	Paint	0.5%, 1%
	Hydrogen Peroxide	U	Solution	6%
	Povidone Iodine	U	Solution	5%, 10%
15.2	*Disinfectants*			
	Bleaching powder	U	Powder	
	Formaldehyde IP	U	Solution	
	Glutaraldehyde	S,T	Solution	2%
	Potassium permanganate	U	Crystals for solution	
16.	**Diuretics**			
	Furosemide	U	Injection	10 mg / ml
			Tablets	40 mg
	Hydrochlorothiazide	U	Tablets	25 mg, 50 mg
	Mannitol*	U	Injection	10%, 20%
	Spironolactone	U	Tablets	25 mg
17.	**Gastrointestinal medicines**			
17.1	*Antacids and other antiulcer medicines*			
	Aluminium hydroxide + Magnesium hydroxide	U	Tablet Suspension	
	Omeprazole	U	Capsules	10 mg, 20 mg, 40 mg
	Ranitidine hydrochloride	U	Tablets	150 mg, 300 mg
			Injection	25 mg / ml
17.2	*Antiemetics*			
	Domperidone	U	Tablets	10 mg
			Syrup	1 mg / ml
	Metoclopramide	U	Tablets	10 mg
			Syrup	5 mg / ml
			Injection	5 mg / ml

	Prochlorperazine	U	Tablets	5 mg, 25 mg
	Promethazine	U	Tablets	10 mg, 25 mg
			Elixir or Syrup	5 mg / 5 ml
			Injection	25 mg / ml
17.3	*Antihaemorrhoidal medicines*			
	Local anaesthetic, astringent and anti-inflammatory medicines	U	Ointment or Suppository	
17.4	*Anti-inflammatory medicines*			
	Sulfasalazine	T	Tablets	500 mg
17.5	*Antispasmodic medicines*			
	Dicyclomine hydrochloride	U	Tablets	10 mg
			Injection	10 mg / ml
	Hyoscine butyl bromide	U	Tablets	10 mg
			Injection	20 mg / ml
17.6	*Laxatives*			
	Bisacodyl	U	Tablets or Suppository	5 mg
	Isphaghula	U	Granules	
17.7	*Medicines used in diarrhoea*			
17.7.1	*Oral rehydration salts*			
	Oral rehydration salts	U	Powder for solution	As per IP
17.7.2	*Antidiarrhoeal medicines*			
	Furazolidone	S, T	Tablets	100 mg
			Syrup	25 mg / 5 ml
	Loperamide* (Contraindicated for paediatric use)	S, T	Capsules	2 mg
18.	**Hormones, other endocrine medicines and contraceptives**			
18.1	*Adrenal hormones and synthetic substitutes*			
	Dexamethasone	S, T	Tablets	0.5 mg
			Injection	4 mg / ml
	Hydrocortisone sodium succinate	U	Injection	100 mg / ml
	Methylprednisolone	S, T	Injection	40 mg / ml
	Prednisolone	U	Tablets	5 mg, 10 mg
18.2	*Androgens*			
	Testosterone	T	Capsules	40 mg (as undecanoate)
			Injection	25 mg / ml (as propionate)

18.3	*Contraceptives*			
18.3.1	*Hormonal contraceptives*			
	Ethinylestradiol + Levonorgesterol	U	Tablets	0.03 mg + 0.15 mg
	Ethinylestradiol + Norethisterone	U	Tablets	0.035 mg + 1.0 mg
	Hormone releasing IUD	T	Levonorgesterol releasing IUD	
18.3.2	*Intrauterine devices*			
	IUD containing Copper	U		
18.3.3	*Barrier methods*			
	Condoms	U		
18.3.4	*Non-hormonal contraceptives*			
	Centchroman	U	Tablets	30 mg
18.4	*Estrogens*			
	Ethinylestradiol	U	Tablets	0.01 mg, 0.05 mg
18.5	*Antidiabetics and hyperglycaemics*			
18.5.1	*Insulins and other antidiabetic agents*			
	Glibenclamide	U	Tablets	2.5 mg, 5 mg
	Insulin (Soluble)	U	Injection	40 IU / ml
	Insulin, Intermediate acting (Lente / NPH insulin)	U	Injection	40 IU / ml
	Metformin	U	Tablets	500 mg
18.5.2	*Hyperglycaemics*			
	Glucagon*	T	Injection	1 mg / ml
18.6	*Ovulation inducers*			
	Clomiphene citrate	T	Tablets	25 mg, 50 mg. 100 mg
18.7	*Progestogens*			
	Medroxyprogesterone acetate	U	Tablets	5 mg, 10 mg
	Norethisterone	U	Tablets	5 mg
18.8	*Thyroid and antithyroid medicines*			
	Carbimazole	S, T	Tablets	5 mg, 10 mg
	Levothyroxine	S, T	Tablets	0.1 mg
	Iodine	S, T	Solution	8 mg / 5 ml
19.	**Immunologicals**			
19.1	*Diagnostic agents*			
	Tuberculin, Purified protein derivative	U	Injection	
19.2	*Sera and immunoglobulins*			
	Anti-D immunoglobulin	S, T	Injection	250 mcg, 300 mcg

	(Human)			
	Antisnake venom serum, Polyvalent	U	Injection	10 ml
	Antitetanus immunoglobulin (Human)	U	Injection	250 IU, 500 IU
	Diphtheria Antitoxin	S, T	Injection	10,000 IU
	Rabies immunoglobulin	U	Injection	150 IU / ml
19.3	*Vaccines*			
19.3.1	*For universal immunisation*			
	B.C.G Vaccine	U	Injection	
	D.P.T Vaccine	U	Injection	
	Hepatitis B Vaccine	U	Injection	
	Measles Vaccine	U	Injection	
	Poliomyelitis vaccine, Oral (Live attenuated)	U	Solution	
19.3.2	*For specific group of individuals*			
	Rabies Vaccine	U	Injection	
	Tetanus Toxoid	U	Injection	
20.	**Muscle relaxants (peripherally acting) and cholinesterase inhibitors**			
	Atracurium besylate*	S, T	Injection	10 mg / ml
	Neostigmine	S, T	Tablets	15 mg
			Injection	0.5 mg / ml
	Pancuronium bromide	S, T	Injection	2 mg / ml
	Pyridostigmine bromide	S, T	Tablets	60 mg
			Injection	1 mg / ml
	Succinylcholine chloride	S, T	Injection	50 mg / ml
21.	**Ophthalmological preparations**			
21.1	*Anti-infective agents*			
	Chloramphenicol	U	Drops or Ointment	0.4%, 1%
	Ciprofloxacin	U	Drops or Ointment	0.3%
	Gentamicin	U	Drops	0.3%
	Miconazole	U	Drops	1%
	Povidone Iodine	S, T	Drops	0.6%
	Sulphacetamide sodium	U	Drops	10%, 20%, 30%
	Tetracycline hydrochloride	U	Ointment	1%
21.2	*Anti-inflammatory agents*			
	Prednisolone acetate	U	Drops	0.1%
	Prednisolone sodium	U	Drops	1%

	phosphate			
	Xylometazoline	U	Drops	0.05%, 0.1%
21.3	*Local anaesthetics*			
	Tetracaine hydrochloride	U	Drops	0.5%
21.4	*Miotics and antiglaucoma medicines*			
	Acetazolamide	S, T	Tablets	250 mg
	Betaxolol hydrochloride	S, T	Drops	0.25%, 0.5%
	Physostigmine salicylate*	S, T	Drops	0.25 %
	Pilocarpine nitrate	S, T	Drops	2%, 4%
	Timolol maleate	S, T	Drops 0.25%,	0.5%,
21.5	*Mydriatics*			
	Atropine sulphate	U	Drops or	
			Ointment	1%
	Homatropine	U	Drops	2%
	Phenylephrine	U	Drops	5%
21.6	*Ophthalmic surgical aids*			
	Methyl Cellulose*	T	Injection	2%
22.	**Oxytocics and antioxytocics**			
22.1	*Oxytocics*			
	Methylergometrine	U	Tablets	0.125 mg
			Injection	0.2 mg / ml
	Mifepristone	T	Tablets	200 mg
	Oxytocin	S, T	Injection	5 IU / ml, 10 IU / ml
22.2	*Antioxytocics*			
	Isoxsuprine hydrochloride	S, T	Tablets	10 mg
			Injection	5 mg / ml
	Terbutaline sulphate	S, T	Tablets	2.5 mg
			Injection	0.5 mg / ml
23.	**Peritoneal dialysis solution**			
	Intraperitoneal Dialysis Solution (of approximate composition)			
24.	**Psychotherapeutic medicines**			
24.1	*Medicines used in psychotic disorders*			
	Chlorpromazine	U	Tablets	25 mg, 50 mg, 100 mg
			Syrup	25 mg / 5 ml
			Injection	25 mg / ml
	Haloperidol	S, T	Tablets	1.5 mg, 5 mg, 10 mg
			Injection	5 mg / ml
	Trifluoperazine	S, T	Tablets	5 mg, 10 mg

24.2	*Medicines used in mood disorders*			
24.2.1	*Medicines used in depressive disorders*			
	Amitriptyline	U	Tablets	25 mg
	Fluoxetine	U	Capsules	20 mg
	Imipramine	U	Tablets	25 mg, 75 mg
24.2.2	*Medicines used in bipolar disorders*			
	Lithium Carbonate	T	Tablets	150 mg
24.3	*Medicines used for generalized anxiety and sleep disorders*			
	Alprazolam	U	Tablets	0.25 mg, 0.5 mg
	Diazepam	U	Tablets	2 mg, 5 mg, 10 mg
	Nitrazepam	U	Tablets	5 mg, 10 mg
24.4	*Medicines used for obsessive compulsive disorders and panic attacks*			
	Clomipramine	S, T	ablets	10 mg, 25 mg
25.	**Medicines acting on the respiratory tract**			
25.1	*Antiasthmatic medicines*			
	Aminophylline	U	Injection	25 mg / ml
	Beclomethasone Dipropionate	U	Inhalation	50 mcg / dose, 250 mcg / dose
	Hydrocortisone sodium succinate	U	Injection	100 mg, 200 mg, 400 m
	Salbutamol sulphate	U	Tablets	2 mg, 4 mg
			Syrup	2 mg / 5 ml
			Inhalation	100 mcg / dose
	Theophylline compounds	U	Tablets	100 mg, 200 mg
25.2	*Antitussives*			
	Codeine phosphate	U	Tablets	10 mg
			Syrup	15 mg / 5 ml
	Dextromethorphan	U	Tablets	30 mg
26.	**Solutions correcting water, electrolyte and acid-base disturbances**			
26.1	*Oral*			
	Oral rehydration salts	U	Powder for solution	As per IP
26.2	*Parenteral*			
	Glucose	U	Injection	5% isotonic
				50% hypertonic
	Glucose with sodium chloride	U	Injection	5% + 0.9%
	Normal saline	U	Injection	0.9%
	N/2 saline	S, T	Injection	
	N/5 saline	S, T	Injection	
	Potassium chloride	U	Injection	11.2%
	Ringer lactate	U	Injection	

	Sodium Bicarbonate	U	Injection	
26.3	*Miscellaneous*			
	Water for injection	U	Injection	2 ml, 5 ml, 10 ml
27.	**Vitamins and Minerals**			
	Ascorbic Acid	U	Tablets	100 mg, 500 mg
	Calcium salts	U	Tablets	250 mg, 500 mg
	Multivitamins	U	Tablets	
	(As per Schedule V)			
	Nicotinamide	U	Tablets	50 mg
	Pyridoxine	U	Tablets	25 mg
	Riboflavine	U	Tablets	5 mg
	Thiamine	U	Tablets	100 mg
	Vitamin A	U	Tablets	5000 IU
			Capsules	10,000 IU, 50,000 IU
			Injection	50,000 IU / ml
	Vitamin D_3 (Ergocalciferol)	S, T	Capsules	0.25 mg, 1 mg

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Note : The above list has been submitted to the Hon'ble Supreme Court of India in the case of SPL No. 3668 of 2003 in the matter of Union of India vs. K.S. Gopinath & Others and would be subject to the final direction given by Hon'ble Court in the matter.

Notifications pertaining to prohibition of Manufacture etc. of drugs

Notifications issued under Section 26 A of the Drugs & Cosmetics Act, 1940:

1. Amidopyrin.
2. Fixed dose combinations of vitamins with anti-inflammatory agents and tranquilisers.
3. Fixed dose combinations of atropine in analgesics and antipyretics.
4. Fixed dose combinations of strychnine and caffeine in tonics.
5. Fixed dose combinations of yohimbine and strychnine with testosterone and vitamins.
6. Fixed dose combinations of iron with strychnine, arsenic and yohimbine.
7. Fixed dose combinations of sodium bromide / chloral hydrate with other drugs.
8. Phenacetin.
9. Fixed dose combinations of antihistaminics with antidiarrhoeals.
10. Fixed dose combinations of penicillin with sulphonamides.
11. Fixed dose combinations of vitamins with analgesics.
12. Fixed dose combinations of tetracycline with vitamin c.
13. Fixed dose combinations of hydroxyquinoline group of drugs except preparations meant for external use.
14. Fixed dose combinations of corticosteroids with any other drug for internal use.
15. Fixed dose combinations of chloramphenicol with any other drug for internal use.
16. Fixed dose combinations of crude ergot except those containing ergotamine, caffeine, analgesics, antihistamines for the treatment of migraine headaches.
17. Fixed dose combinations of vitamins with antitubercular drugs except combination of isoniazid with pyridoxine hydrochloride (vitamin B_6).
18. Penicillin skin / eye ointment.
19. Tetrracycline liquid oral preparations.
20. Nialamide.
21. Practolol.
22. Methapyrilene and its salts.
23. Methaqulone.
24. Oxytetracycline liquid oral preparations.
25. Democlocycline liquid oral preparations.
26. Combinations of anabolic steroids with other drugs.
27. Fixed dose combination of oestrogen and progestin (other than oral contraceptives) containing per tablet oestrogen content of more than 50 mcg (equivalent to ethiny estradiol) and progestin content of more than 3 mg (equivalent to norethisterone acetate and all fixed dose combination injectable preparations containing synthetic oestroge and progesterone.
28. Fixed dose combination of sedatives / hypnotics / anxiolytics with analgesic-antipyretics

29. Fixed dose combination of pyrazinamide with other antitubercular drugs except combination of pyrazinamide with rifampicin and INH as per recommended daily dose given below:

	Minimum	Maximum
Rifampicin	450 mg	600 mg
INH	300 mg	300 mg
Pyrazinamide	1000 mg	1500 mg

30. Fixed dose combination of histamine H_2-receptor antagonists with antacids except those combinations approved by the Drugs Controller, India.
31. The patent and proprietary medicines of fixed dose combinations of essential oils with alcohol having a percentage higher than 20% proof except preparations given in the Indian Pharmacopoeia.
32. All pharmaceutical preparations containing chloroform exceeding 0.5% w/w or whichever is appropriate.
33. Fixed dose combination of ethambutol with Isoniazid (INH) other than the following:

Isoniazid (INH)	Ethambutol
200 mg	600 mg
300 mg	800 mg

34. Fixed dose combination containing more than one antihistamine.
35. Fixed dose combination of anthelmintic with cathartic / purgative except for piperazine.
36. Fixed dose combination of salbutamol or any other bronchodilator with centrally acting antitussive and / or antihistaminic.
37. Fixed dose combination of laxatives and / or antispasmodic drugs in enzyme preparations.
38. Fixed dose combination of metoclopramide with other drugs except for preparations containing metoclopramide and aspirin / paracetamol.
39. Fixed dose combination of centrally acting antitussive with antihistamine, having high atropine like activity, in expectorants.
40. Preparations claiming to combat cough associated with asthma containing centrally acting antitussive and / or other antihistamine.
41. Liquid oral tonic preparations containing glycerophosphates and / or other phosphates and / or central nervous system stimulant and such preparations containing alcohol more than 20% proof.
42. Fixed dose combination containing pectin and / or kaolin with any drug which is systemically absorbed from gastrointestinal tract except for combinations of pectin and / or kaolin with drugs not systemically absorbed.
43. Chloral hydrate as a drug.
44. Dover's Powder I.P.
45. Dover's Powder Tablets I.P.
46. Antidiarrhoeal formulations containing kaolin or pectin or attapulgite or activated charcoal.

47. Antidiarrhoeal formulations containing phthalyl sulphathiazole or sulphaguanidine or succinyl sulphathiazole.
48. Antidiarrhoeal formulations containing neomycin or streptomycin or dihydrostreptomycin, including their respective salts and esters.
49. Liquid oral antidiarrhoeals or any other dosage form for paediatric use containing diphenoxylate or loperamide or atropine or belladonna, including their salts or esters or metabolites; hyoscyamine or their extracts or their alkaloids.
50. Liquid oral antidiarrhoeals or any other dosage form for paediatric use ntaining halogenated hydroxyquinolines.
51. Fixed dose combination or antidiarrhoeals with electrolytes.
52. Patent and proprietary oral rehydration salts other than those conforming to the following parameters:

    (a) Patent and proprietary oral rehydration salts on reconstitution to one liter shall contain:

    - sodium – 50 to 90 millimoles.
    - total osmolarity – not more than 290 millimoles.
    - dextrose : sodium molar ratio – not less than 1:1 and not more than 3:1.

    (b) Patent and proprietary cereal based oral rehydration salts on reconstitution to one liter shall contain:

    - sodium – 50 to 90 millimoles.
    - total osmolarity – not more than 290 millimoles.
    - precooked rice - equivalent to not less than 50 gms, and not more than 80 gms, as total replcement of dextrose.

    (c) Patent and proprietary oral rehydration salts (ors) may contain amino acids in addition to oral rehydration salts conforming to the parameters specified above and labeled with the indication "for adult choletric diarrhoea only".

    (d) patent and proprietary oral rehydration salts shall not contain mono- or polysaccharides or saccharine sweetening agent.
53. Fixed dose combination of oxyphenbutazone or phenylbutazone with any other drug.
54. Fixed dose combination of analgin with any other drug. [The words 'other than antispasmodics' omitted by G.O.I. notification no.405(E) dt. 03.06.1999.]
55. Fixed dose combination dextropropoxyphene with any other drug other than antispasmodics and / or non-steroidal anti-inflammatory drugs (NSAIDS).
56. Fixed dose combination of a drug, standards of which are specified in the Second Schedule to the said Act with an Ayurvedic, Siddha or Unani drug.
57. Mepacrine hydrochloride (quinacrine and its salts) in any dosage form for use for female sterilization or contraception.
58. Fenfluramine and dexfenfluramine.
59. Fixed dose combination of diazepam and diphenhydramine hydrochloride.

- Items 1 to 22 were prohibited as per G.O.I. notification No. G.S.R.578(E) dt.

23.07.1983. and items 14 and 15 were subs. by G.O.I. notification No.X.11014/2/88 DMS&PFA. G.S.R.1057(E) dt. 03.11.1988.

- Item No.13 was subs. By G.O.I. notification No.G.S.R.793(E) dt. 13.12.1995.
- Item no. 23 was Ins. by G.O.I. notification No.G.S.R.49(E) dt. 31.01.1994.
- Items no.24 and 25 were Ins. by G.O.I. notification No.G.S.R.322(E) dt. 03.05.1984.
- Item no. 26 was Ins. by G.O.I. notification No.G.S.R.863(E) dt. 22.11.1985.
- Item no. 27 was Ins. by G.O.I. notification No.G.S.R.700(E) dt.15.06.1988 and was subs. by G.O.I. notification No.G.S.R.743(E) dt. 10.08.1989.
- Items nos. 28 to 32 were Ins. by G.O.I. notification No.G.S.R.999(E) dt. 26.12.1990.
- Items nos. 33 to 42 were Ins. by G.O.I. notification No.G.S.R.69(E) dt. 11.02.1991. and Item no. 38 was subs. by G.O.I. notification No.G.S.R.603(E) dt.24.08.2001.
- Item no 43 was Ins. by G.O.I. notification No.G.S.R.304(E) dt. 07.06.1991.
- Items nos. 44 and 45 were Ins. by G.O.I. notification No.G.S.R.111(E) dt. 22.02.1994 and corrected by G.S.R. No. 612(E) dt. 09.08.1994.
- Items nos. 46 to 51 were Ins. by G.O.I. notification No.G.S.R.731(E) dt. 30.09.1994.
- Item no. 52 was Ins. by G.O.I. notification No.G.S.R.57(E) dt. 07.02.1995.
- Items nos. 53 to 56 were Ins. by G.O.I. notification No.G.S.R.633(E) dt. 13.09.1995.
- Items nos. 57 and 58 were Ins. by G.O.I. notification No.G.S.R.499(E) dt. 14.08.1998.
- Items nos.59 and 60 which had been ins. by G.O.I. notification No.590(E) dt. 17.08.19999 were deleted by G.O.I. notification No.704(E) dt. 20.10.1999.
- The present item 59 was Ins. by G.O.I. notification No.G.S.R.169(E) dt. 12.03.2001.

Other drugs prohibited without being made part of the list above:

60. Fixed dose combination of penicillin with streptomycin vide G.O.I. notification No. G.S.R. No. 93(E) dt. 25.02.1997, w.e.f. 01.01.1998.
61. Fixed dose combination of vitamin B_1, vitamin B_6 and vitamin B_{12} vide G.O.I. notification No. G.S.R. No.702(E) dt.14.10.1999, w.e.f. 01.01.2001.
62. Fixed dose combination of haemoglobin in any form (natural or synthetic) vide G.O.I. notification No. GSR 814(E) dt. 16.12.99, w.e.f. 01.09.2000.
63. Fixed dose combination of pancreatin with pancrelipase containing amylipase, protease and lipase with any other enzyme vide G.O.I. notification No. G.S.R. 814(E) dt.16.12.1999, w.e.f. 01.09.2000.
64. Fixed dose combination of nitrofurantoin and trimethprim.
65. Fixed dose combination of phenobarbitone with any antiasthmatic drug.
66. Fixed dose combination of phenobarbitone with hyoscine and / or hyoscyamine.
67. Fixed dose combination of phenobarbitone with ergotamine and / or belladonna.
68. Fixed dose combination of haloperidol with any anticholinergic agent including propanthalene bromide.
69. Fixed dose combination of nalidixic acid with any antiamoebics including metronidazole.
70. Fixed dose combination of loperamide hydrochloride with furazolidone.

71. Fixed dose combination of cyproheptadine with lysine or peptone.

- Items 64 to 71 above prohibited vide G.O.I. notification. No G.S.R.170(E) dt. 12.03.2001, w.e.f. 01.01.2002.

72. Astemizole vide G.O.I. notification No. GSR 191(E) dt. 05.03.03, w.e.f. 01.04.2003.

73. Terfenadine vide G.O.I. notification No. GSR 191(E) dt. 05.03.03, w.e.f. 01.04.2003.

74. Phenformin vide G.O.I. notification No. GSR 780(E) dt. 01.10.03, w.e.f. 01.10.2003.

75. Rofecoxib vide G.O.I. notification No. GSR 810(E) dt. 13.12.04, w.e.f. 13.12.2004.

76. Valdecoxib and its formulations vide G.O.I. notification No. GSR 510(E) dt. 25.07.05, w.e.f. 25.07.2005.

Drugs prohibited under Section 33 E of the Drugs and Cosmetics Act, 1940:

77. All Ayurvedic drugs licensed as tooth pastes / tooth powders containing tobacco vide G.O.I. notification No.G.S.R.443(E) dt. 30.04.2002.

COSMETIC prohibited under Section 26 A of the Drugs and Cosmetics Act, 1940:

78. Tooth pastes/ tooth powders containing tobacco vide G.O.I. notification No.G.S.R.444(E) dt. 30.04.2002.

Notifications pertaining to prohibition of Import of drugs

Notifications issued under Section 10 A of the Drugs & Cosmetics Act,1940:

Vide G.O.I. notification No. G.S.R. 577(E) dt. 23.07.1983.

1. Nialamide.
2. Practolol.
3. Amidopyrin.
4. Phenacetin.
5. Methapyrilene and its salts.

Vide G.O.I. notification No. G.S.R. 48(E) dt. 31.01.1984.

6. Methaqualone.

Vide G.O.I. notification No. G.S.R. 303(E) dt. 07.06.1991.

7. Chloral hydrate as a drug.

Vide G.O.I. notification No. G.S.R. 498(E) dt. 14.08.1998.

8. Mepacrine hydrochloride (quinacrine and its salts) in any dosage form for use for female sterilization or contraception.
9. Fenfluramine and dexfenfluramine.

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